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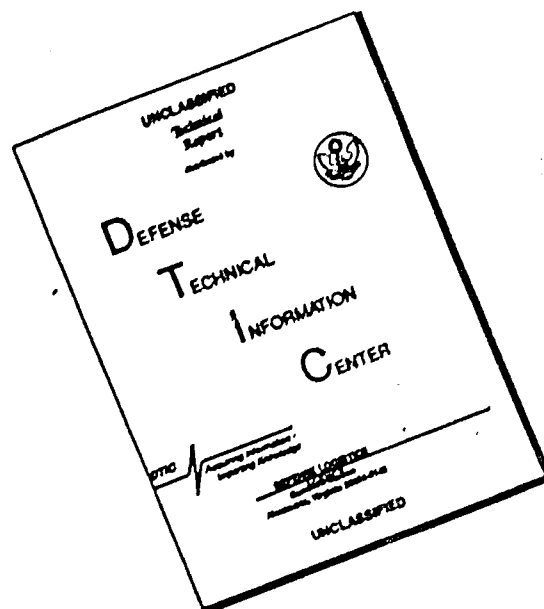
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ARMY CONCEPT TEAM IN VIETNAM  
APO San Francisco 96243

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SEARCHLIGHT  
ILLUMINATION (U)

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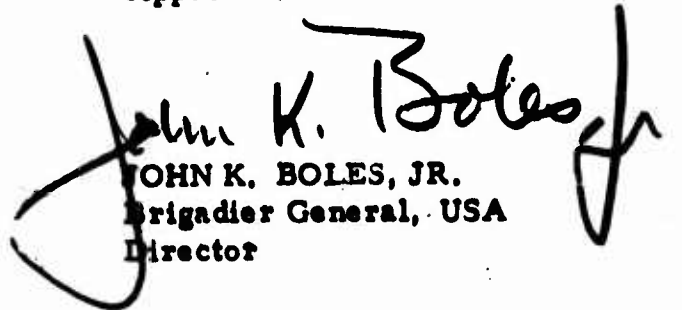
**JOINT RESEARCH AND TEST ACTIVITY**

**Office of the Director  
APO San Francisco 96309**

**REPORT EVALUATION BY DIRECTOR, JRATA**

Searchlights were brought into Vietnam to determine the feasibility of employment in a counterinsurgency environment. As is generally known, one of the principal differences between counterinsurgency and conventional wars is that the majority of insurgent operations are conducted under the cover of darkness. Therefore, illumination of the battle area has become vital. The evaluation proved that the searchlights do provide needed illumination and that employment of searchlight units is both feasible and desirable. I concur in the conclusions and recommendations of the report and strongly urge that not only ARVN be issued searchlights as per these recommendations, but that US searchlight batteries be organized, equipped, trained and dispatched to the RVN on the basis of one battery per brigade-sized US force.

Approved:

  
JOHN K. BOLES, JR.  
Brigadier General, USA  
Director

30 November 1965

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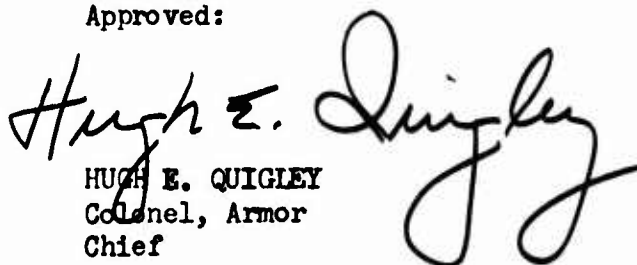
ARMY CONCEPT TEAM IN VIETNAM  
APO San Francisco 96243

FINAL REPORT  
**SEARCHLIGHT  
ILLUMINATION (U)**

JRATA Project No. 1B-160.0

30 November 1965

Approved:

  
HUGH E. QUIGLEY  
Colonel, Armor  
Chief

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## **AUTHORITY**

Letter, AGAM-P (M) (17 July 64) ACSFOR,  
Department of the Army, 31 July 64,  
Subject: Army Troop Test Program in  
Vietnam (U), as amended.

CINCPAC message DTG 182303Z August 64.

## **ACKNOWLEDGMENTS**

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in the evaluation:

Combat Developments Test Center - Vietnam  
ARVN artillery commanders  
MACV artillery advisors  
US Army searchlight training team  
Artillery Searchlight Platoon, ARVN

## **PROJECT OFFICER**

Captain Francis W. McDonald Jr., Armor

## **EVALUATOR**

Lieutenant Colonel Jack J. Price, Artillery

# CONTENTS

	<u>Page</u>
<b>I. PREFACE</b>	
A. Abstract . . . . .	v
B. Objectives and Methods . . . . .	v
C. Summary of Conclusions and Recommendations . . .	vi
<b>II. INTRODUCTION</b>	
A. Purpose . . . . .	1
B. Background . . . . .	1
C. Description of Materiel . . . . .	3
D. Scope . . . . .	5
E. Evaluation Design . . . . .	6
<b>III. DISCUSSION</b>	
A. Objective 1 - Tactics and Techniques of Employment	9
B. Objective 2 - Equipment Performance . . . . .	17
C. Objective 3 - Equipment Vulnerability . . . . .	21
D. Objective 4 - Maintenance and Logistics Problems	21
E. Objective 5 - Future Requirements in RVN . . . .	26
<b>IV. CONCLUSIONS AND RECOMMENDATIONS</b>	
A. Conclusions . . . . .	31
B. Recommendations . . . . .	31
<b>ANNEXES</b>	
A. Setting of the Evaluation . . . . .	A-1
B. Table of Organization and Equipment Field Artillery Searchlight Platoon (Provisional) Army of the Republic of Vietnam . . . . .	B-1
C. Characteristics of the Searchlight and Generator	C-1
D. Equipment Maintenance Records . . . . .	D-1
E. Equipment Faults . . . . .	E-1
F. Repair Parts . . . . .	F-1
G. Combat Operations . . . . .	G-1
H. Proposed Table of Organization Field Artillery Searchlight Battery ARVN . . . . .	H-1
I. References . . . . .	I-1
J. Distribution . . . . .	J-1



## FIGURES

<u>Figure</u>	<u>Page</u>
1. 30-inch Searchlight . . . . .	4
2. 20-kw Generator . . . . .	4
3. Organization Chart, ARVN Searchlight Platoon . . . . .	10
4. 30-inch Searchlight Capabilities (FM 20-60) . . . . .	18
5. Organization Chart, Proposed ARVN Searchlight Battery . . . . .	28
A-1. Geographical Regions, RVN . . . . .	A-2
A-2. Annual Precipitation, RVN . . . . .	A-4
A-3. Searchlight Locations . . . . .	A-7
E-1. Control Box Cables (New Bonded Cable on Right) . . . . .	E-3

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## I (C) PREFACE

### A. ABSTRACT

The purpose of this evaluation was to determine the feasibility and desirability of employing artillery searchlights in the counterinsurgency effort in the Republic of Vietnam (RVN).

From 26 December 1964 to 30 April 1965, the Army Concept Team in Vietnam (ACTIV) conducted the evaluation of 30-inch diameter reflector carbon arc searchlights. This was accomplished by observing and analyzing operations of a test searchlight platoon of the Army of the Republic of Vietnam (ARVN) which was equipped with six US Army 30-inch searchlights. The evaluation was conducted under actual combat conditions and in no instance was the platoon employed merely to satisfy specific evaluation objectives.

The evaluation revealed that 30-inch searchlights could be effectively employed in counterinsurgency operations. The employment of the lights in pairs assured the availability of illumination when requested and allowed the platoon to support a large area.

It was concluded that introduction of additional searchlight units into Vietnam is desirable. However, prior to the organization of these units, Vietnamese mechanics and technicians must be thoroughly trained in all echelons of maintenance due to the complexity of the equipment.

### B. OBJECTIVES AND METHODS

#### 1. Objective 1 - Tactics and Techniques of Employment

Evaluate the tactics and techniques of employment of the field artillery searchlight platoon.

Methods for meeting objective 1 were to summarize observations of evaluators and to interview key platoon officers.

#### 2. Objective 2 - Equipment Performance

Evaluate the performance of the 30-inch general purpose searchlight system in a tactical environment.

Methods for meeting objective 2 were to conduct discussions with supported commanders and their US advisors, to interview key officers of the platoon, to search unit operation records, and to summarize reports of observations furnished by the US Army training team.

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## 3. Objective 3 - Equipment Vulnerability

Evaluate the vulnerability of the searchlights to enemy action in an insurgency environment.

Objective 3 was not met because of the lack of enemy action against the searchlights.

## 4. Objective 4 - Maintenance and Logistics Problems

Evaluate the maintenance and logistics support problems of the searchlight platoon in counterinsurgency operations.

Methods for meeting objective 4 were to interview key platoon officers and technical support personnel, and to analyze data from unit maintenance records.

## 5. Objective 5 - Future Requirements in RVN

Determine the number, distribution, and organization of searchlight units required, if any, within ARVN.

The method for meeting objective 5 was to interview ARVN commanders, US advisors, and key platoon officers.

## C. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

The 30-inch searchlight can be effectively employed in Vietnam. However, no US or Vietnamese doctrine exists for employing searchlights in counterinsurgency operations. The lights were effectively employed in pairs and if placed on high ground, the effective range of direct illumination could be substantially increased. The 30-inch searchlight is a complex piece of equipment and training of mechanics in all echelons of maintenance is required prior to placing units in the field. Based on these conclusions, ACTIV recommends that additional 30-inch searchlight units be organized on the basis of one battery of six lights assigned to each ARVN corps tactical zone. Prior to the introduction of any additional searchlights into Vietnam, trained personnel, including factory technical representatives, should be brought to Vietnam to instruct Vietnamese searchlight mechanics and technicians. This should be done as soon as possible to insure the maintenance support of the searchlights presently in Vietnam. It is further recommended that the Artillery Command, Republic of Vietnam Armed Forces and the US Army Artillery and Missile School develop and exchange doctrine for employing searchlights in counterinsurgency operations.

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## II (C) INTRODUCTION

### A. PURPOSE

The purpose of this evaluation was to determine the feasibility and desirability of employing artillery searchlights in the counterinsurgency effort in the Republic of Vietnam.

### B. BACKGROUND

Insurgent forces operating against the Republic of Vietnam have used the cover of darkness to their advantage. On occasion, well-fortified government positions have been overcome at night by guerrilla forces which probably would have been repulsed during daylight or under artificial daylight conditions. In fact, small government garrisons have repelled attacks by relatively large enemy forces when the battle area was effectively illuminated. On many occasions the Viet Cong have broken off attacks when they met determined resistance and when deprived of the cover of darkness.

The most widely used and most effective technique of battlefield illumination so far has been flare-drops by aircraft of the US and Vietnamese Air Forces. During the hours of darkness, these aircraft are on station in the general vicinity of possible trouble areas, and are on call to illuminate an area which comes under enemy attack. Aircraft remain on station until their fuel or flare loads are expended. Backup aircraft are on call to replace the on-station aircraft.

The aircraft flare-drop technique has, however, certain limitations. Some of these limitations are:

- 1) Non-availability of aircraft
- 2) Weather unsuitable for flying
- 3) Limited number of flares carried by the aircraft
- 4) The limited amount of time aircraft can stay on station
- 5) Relative high cost in personnel and equipment
- 6) Inaccuracy in drop

Searchlights were used successfully in World War II and the Korean War. Since there were no searchlight units in the ARVN, J3 Military

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Assistance Command, Vietnam (MACV) proposed to introduce an artillery searchlight platoon. Initial plans, concurred in by the Commander, MACV on 30 July 1964, called for a US Army platoon, an element of TOE 6-558D, to be brought to Vietnam for a 90-day field evaluation. However, Department of the Army (DA) advised that the last two active army searchlight platoons were deactivated during February 1964. As an alternative, COMUSMACV requested shipment of whatever equipment of TOE 6-558D that might be necessary to equip a Vietnamese searchlight platoon. Also requested was a US Army training team, consisting of one officer and six non-commissioned officers, to train the Vietnamese platoon. The Commander-in-Chief, Pacific concurred in the proposed project on 18 August 1964 and Department of the Army approved the equipment request on 24 August. Six new Standard A, 30-inch searchlight sets were earmarked for shipment to Vietnam in lieu of the Standard B, 60-inch searchlights listed in TOE 6-558D. This substitution was made on the assumption that it would insure the availability of maintenance repair parts.

The project was concurred in by the J3, Republic of Vietnam Armed Forces (RVNAF) on 13 August 1964, and received final approval from the Minister of Defense, RVN, on 22 October 1964. The RVNAF agreed to furnish the personnel and any equipment available from in-country resources. The ARVN Artillery Command was designated as the responsible agency for activation and employment of the platoon.

The searchlights arrived in Vietnam on 23 October 1964 and were followed by six trailer-mounted 20 kw Hol-Gar generators which arrived on 30 October 1964. Since this equipment was US Army property, and since it would remain so throughout the evaluation, property accountability was maintained by ACTIV. On 6 November 1964, ACTIV issued the equipment by hand receipt to the 40th Engineer Base Depot, ARVN, which in turn issued it to the searchlight platoon.

The platoon was activated on 23 November 1964 at Camp Co Loa on the outskirts of Saigon. The 252nd Artillery Battalion was given the responsibility of administrative support and supervision of the platoon during its training phase. The training program consisted of three weeks of instruction given by the US Army training team. Upon completion of the training program an additional one week review of maintenance and trouble shooting procedures was conducted. On the morning of 23 December the platoon leader conducted a detailed briefing on the capabilities of and methods for employing searchlights, which was followed that evening by a demonstration for senior ARVN officers.

During the period from 26 December 1964 to 19 January 1965 the platoon was under the operational control of III Corps. From 22 January to 12 February the platoon was under the operational control of IV Corps. Data were collected throughout these periods by the ACTIV evaluator and members of the US Army Training Team.

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On 17 February the platoon loaded aboard a Vietnamese Navy LST for shipment to Da Nang. The platoon arrived at Da Nang on 24 February and came under I Corps control. On 15 March, while the platoon was operating in I Corps, the US Army training team completed its TDY and returned to CONUS. The platoon terminated operations in I Corps area on 26 March. At this point three of the six searchlights were deadlined for various causes and were beyond the capability of the platoon to repair. On 28 and 29 March the three deadlined lights were flown to Saigon by USAF C-123 and turned over to the 40th Engineer Base Depot. The remainder of the platoon departed Da Nang by LST on 5 April and arrived at Saigon on 10 April.

The 40th Engineer Depot did not have personnel who were sufficiently trained to repair the lights. Therefore, the lights were turned over to Combat Development Test Center - Vietnam (CDTC-V) which repaired them and returned them to the platoon on 26 April. Since it was not considered practical to continue the field evaluation while the lights were being repaired, the proposed employment with the 7th Division was cancelled. The evaluation was officially terminated on 30 April 1965 as ~~scheduled~~.

## C. DESCRIPTION OF MATERIEL

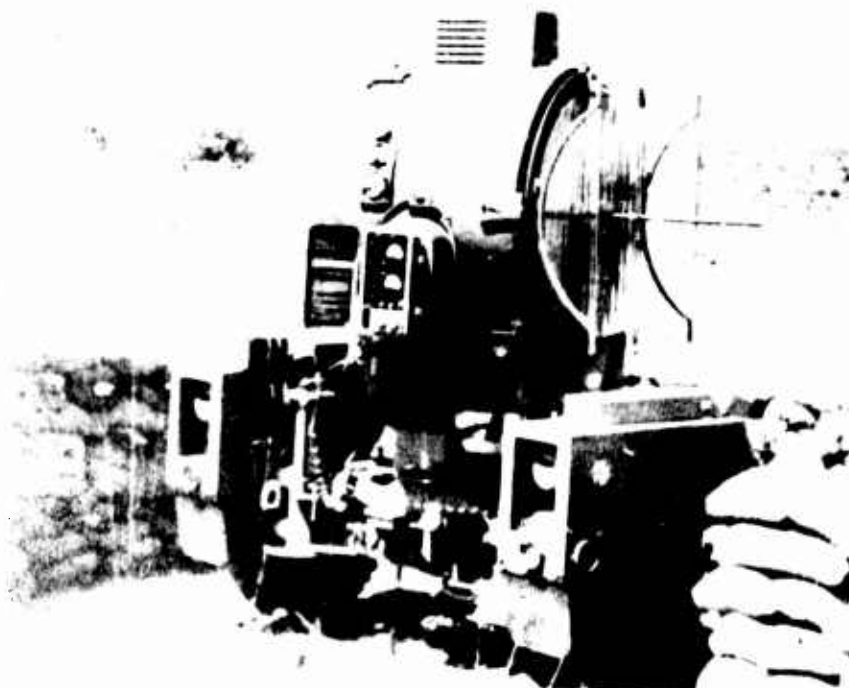
### 1. Searchlight

The 30-inch diameter reflector searchlight (figure 1) is manufactured by the Strong Electric Corporation, Toledo, Ohio. It is a weather-resistant, general-purpose, trailer-mounted unit, complete with all necessary operating controls. The searchlight is of the carbon arc type and provides a peak intensity of 400 million candle power through two different modes of illumination: focused beam (52 mils wide) and a spread beam (180 mils wide). The lamp drum assembly of the searchlight may be rotated through 6400 mils in azimuth and from minus 400 mils to plus 1775 mils in elevation from the horizontal. The searchlight can be placed in operation either mounted on the trailer or dismounted. Electrical power is obtained from a portable engine-driven generator. Additional data on the searchlight are shown in annex C.

### 2. Generator

The model CE-856 PM/WKI 20-kw Generator Set (figure 2) is manufactured by the Hol-Gar Manufacturing Corporation, Clifton Heights, Pennsylvania. It is a self-contained, lightweight, gasoline engine-driven, trailer-mounted electrical power unit. It provides approximately 200 amperes of direct current at approximately 80 volts for normal operation and is designed to power the 30-inch searchlight. It is equipped with two 150-foot power cables, cable reels, and other accessories necessary to connect it to the searchlight. Additional data on the generator are shown in annex C.

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(U) FIGURE 1. 30-inch searchlight.



(U) FIGURE 2. 20-kw generator.

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## D. SCOPE

### 1. Definition of the Project

A Vietnamese Army searchlight platoon was trained by a US Army training team, TDY to MACV, prior to the start of the ACTIV evaluation. The platoon used equipment of a US Army searchlight platoon, an element of TOE 6-558D, which was furnished by DA. At all times during the evaluation, the platoon was under the command of ARVN commanders. The Army Concept Team evaluated the platoon for a period of 126 days during missions assigned and performed by the ARVN.

The project included documentation, analysis, and recommendations on the tactics and techniques employed, the performance and vulnerability of the equipment, maintenance and logistic problems encountered, and composition of the platoon for counterinsurgency operations in Vietnam.

### 2. Setting of the Project

#### a. Environment

The evaluation was conducted along the northern portion of the coastal plain and in the Mekong River Delta. The coastal plain consisted of sandy beaches and dunes, backed by rice fields, fertile farmland, marshes, and mountain spurs which in several places jutted out to the sea. The delta region consisted of rice paddies, swamps, and mangrove-palmetto marshes. The dry season in the delta and the wet season along the coastal plain provided an environment of all weather conditions common to Vietnam. During the dry season there was nearly a total lack of cloud formations throughout the day. However, a haze caused by smoke and dust often developed throughout the night. As the monsoon season developed, clouds formed restricting visibility in varying degrees from a few clouds to frequently zero conditions as the heavy tropical rains moved across the country.

#### b. Military Elements

During the evaluation the searchlight platoon conducted operations in I, III, and IV ARVN Corps Tactical Zones. Elements of the platoon conducted operations with seven of the then nine ARVN divisions plus Da Nang Special Sector and Dong Nai Sensitive Area (Bien Hoa Airbase).

### 3. Definition of Terms

a. Artificial moonlight is illumination of an intensity between that of starlight and that of a full moon on a clear night.

b. Artificial daylight is illumination of an intensity greater

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than the light of a full moon on a clear night. (The optimum illumination is the equivalent of daylight.)

c. Direct illumination is provided when the beam of the searchlight is placed on the target.

d. Indirect illumination is provided by diffusion or reflection of direct light.\*

(1) Illumination by diffusion is provided in the area beneath and to the flanks of a slightly elevated searchlight beam by the light scattered by atmospheric particles.

(2) Illumination by reflection is provided by reflection of a direct light source from low-lying clouds (150 to 900 meters).

e. On-call illumination is that which is prearranged as to location but not as to time of illuminating.

f. Scheduled illumination is that which is prearranged both as to location and time of illuminating.

g. Targets of opportunity are those for which illumination is not prearranged.

## E. EVALUATION DESIGN

### 1. Methodology

#### a. Data Collection Methods

Data were collected by the ACTIV evaluator and members of the US Army training team. They observed the training and operations of the platoon and recorded their observations. Interviews with supported unit commanders, their US advisors and personnel of the searchlight platoon were also conducted. In addition, records as to missions, maintenance, and POL consumption were maintained by the platoon.

#### b. Analysis Methods

A comparative analysis was made of the direct observations and interviews in order to determine the tactics and techniques employed and to determine what requirements existed in the RVN. Six case studies were made to assist in determining typical methods of employment. Maintenance and logistics records were analyzed to determine equipment performance and maintenance.

\*FM 6-115 and FM 20-60

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## 2. Limitations and Variables

The searchlight platoon was under the command of the ARVN commanders to which it was attached and the evaluation was conducted under actual combat conditions; therefore, controlled testing was not possible. Lack of measuring devices and limitations imposed by operational requirements prevented the accurate measurement of ambient light and cloud conditions during searchlight operations. It was realized in planning the evaluation that a determination of the vulnerability of the equipment was dependent upon VC attempts to neutralize the lights.

## 3. Support Requirements

Personnel and equipment available from in-country resources were furnished by the High Command, RVNAF upon request from the Combat Developments Test Center-Vietnam. The searchlight sets were standard US Army items sent to Vietnam in response to a MACV operational requirement. A searchlight costs \$33,433.00 per set (searchlight, generator and operational spares). A 6 months' supply of repair parts for all lights was funded by MACV at a cost of \$46,635.00 (\$7,772.50 per set). The US Army combat Developments Command provided TDY funds in support of the US Army training team, the ACTIV evaluator, and the clerk typist. The searchlights were transferred to the Military Assistance Program on 10 June 1965.

## 4. Time Schedule

- a. The project was approved by CINCPAC on 18 August 1964.
- b. The searchlights arrived in Vietnam on 23 October 1964.
- c. The US Army training team arrived in Vietnam on 11 November 1964.
- d. Training of the platoon began on 23 November and ended on 23 December 1964.
- e. The platoon was deployed to the field on 26 December 1964.
- f. Data were collected from 26 December 1964 to 30 April 1965. (126 days).

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## III (C) DISCUSSION

### A. OBJECTIVE 1 - TACTICS AND TECHNIQUES OF EMPLOYMENT

#### 1. Introduction

The tactics and techniques employed by the ARVN searchlight platoon were based on the basic doctrine found in US Army Field Manuals 6-115 and 20-60. However, neither of these manuals contained specific doctrine on employing searchlight units in counterinsurgency operations. Therefore, it was necessary to modify the doctrine to fit the counterinsurgency situation in Vietnam.

Since ARVN did not possess any searchlight units prior to the organization of the test platoon, and the US Army had not employed searchlights in combat since the Korean War, neither ARVN commanders nor their US advisors had appreciable training or experience in searchlight use. Thus, to insure a minimum acquaintance with the capabilities and limitations of searchlights as a means of battlefield illumination, a series of briefings and demonstrations were conducted in each area where the searchlights were employed. In addition, printed copies of the detailed briefing given on 23 December 1964 were distributed to all corps artillery commanders and their US advisors for further distribution to their subordinate units and to the units within their areas that would be requesting illumination. The information contained in this briefing was taken from Field Manuals 6-115 and 20-60 as well as technical publications which were provided by the manufacturer.

#### 2. Organization

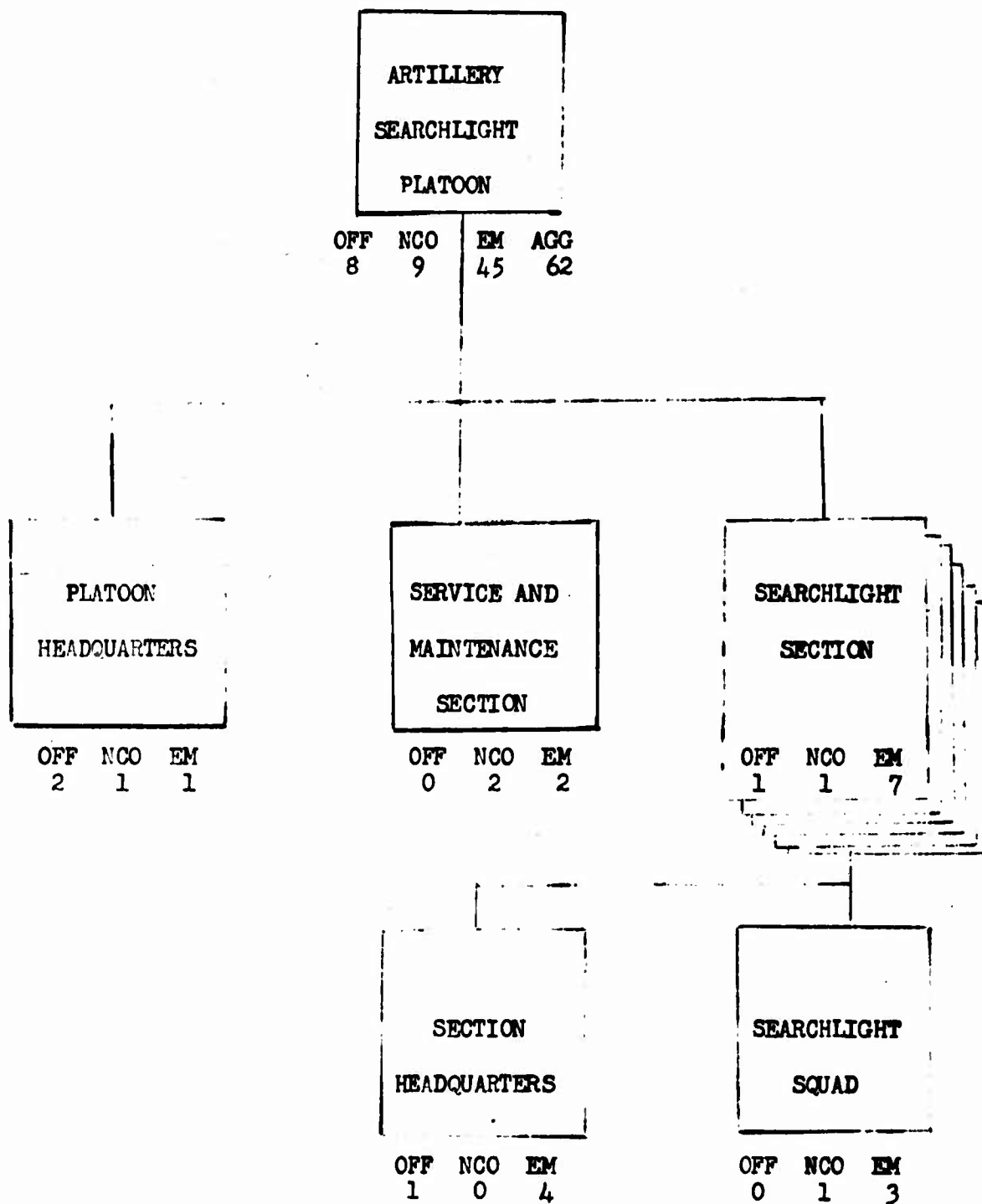
The organization of the Vietnamese searchlight platoon was patterned after that of the US Army searchlight platoon found in TOE 6-558D. The test platoon (figure 3) consisted of 8 officers, 9 NCO's, 45 EM and the equipment necessary to accomplish its illumination mission, to provide transportation, and to a limited extent, to perform administration, communication, and maintenance functions. The platoon was not able to provide entirely its own administration and, therefore, was attached to the 252nd Artillery Battalion for this purpose.

The platoon was organized as follows:

- a) The platoon headquarters section, consisting of two officers, one NCO, and one EM, and the equipment required to perform command functions for the platoon.
- b) The service and maintenance section, consisting of two NCO's

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(C) FIGURE 3. Organization chart, ARVN searchlight platoon.

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two EM, and the equipment required to perform motor maintenance, general repair work, and supply functions for the platoon.

- c) Six searchlight sections, each consisting of a section headquarters and a searchlight squad. The section headquarters consisted of one officer, four EM, and the equipment necessary to operate a light direction center (LDC) and exercise command control over the section. The searchlight squad consisted of one NCO, three EM, and the equipment necessary to operate one searchlight and generator.
- d) In addition, six engineer mechanics were attached to the platoon from the 40th Engineer Base Depot to perform third echelon maintenance on the searchlight sets.

The complete TOE of the test platoon is listed in annex B.

The major organizational differences between the ARVN test platoon and either a US searchlight platoon or battery were the addition of the service and maintenance section and the addition of an LDC within each searchlight section. The service and maintenance section was necessary to perform those supply and maintenance functions that would normally be performed at battery level. The LDC within each searchlight section was added in order to make each section capable of independent operation. However, no survey or mess personnel were added to the platoon. Survey, if required, was to have been furnished by corps or division artillery. One member of each section was normally assigned as a cook.

The major equipment differences were the addition of four 2½-ton trucks and the substitution of 3/4-ton trucks for 1/4-ton trucks as prime movers for the searchlights. The 2½-ton trucks were necessary to move equipment which in the US Army is handled as post, camp, and station property (PC&S). Since ARVN does not use a system of PC&S property, it was necessary for the platoon to carry this equipment whenever it was attached to a unit. The 3/4-ton trucks were issued because of a shortage of 1/4-ton trucks at the time the platoon was organized. The 3/4-ton trucks proved to be adequate prime movers for the searchlights and gave the platoon added carrying capacity.

The test platoon organization was adequate for accomplishing its assigned mission; however, it might have been more effective if it had been organized as a battery of six lights rather than as a platoon of six lights. The additional personnel in the battery headquarters would have made the unit self-sufficient in the areas of administration and communication. Also, it became apparent that a more senior commander would have been more effective because the Vietnamese, by nature, are reluctant to accept recommendations from subordinates. The recommendations which originated from the platoon size unit received a poor response from

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senior commanders. The employment of the searchlight sections in pairs, which will be discussed later, would lend itself to the organization of the sections into platoons of two lights each. The battery organization would bring the searchlights under the same basic organization as ARVN artillery batteries.

### 3. Employment

Missions assigned to the searchlight platoon during the evaluation included general support of outposts, hamlets, and fixed installations, and direct support of ARVN and Regional Force night operations which included search and destroy, ambush patrols, and occupation of field defensive positions. In addition, the searchlights were called upon to illuminate the route of march for a motorized relief column and to provide illumination for the relief force while it occupied its position.

The preferred method of illumination used by the ARVN searchlight platoon was direct illumination. Early success with this method of illumination demonstrated its effectiveness and the Vietnamese were reluctant to try other methods. However, illumination by diffusion was used successfully on several occasions when intervening obstacles prevented the use of direct illumination. Illumination by reflection was attempted only twice during the evaluation because of insufficient cloud cover during the dry season. In both cases the supported commanders felt that direct illumination would have been more effective.

As mentioned previously the searchlight platoon conducted operations in all types of terrain and weather conditions that exist in Vietnam. Because the corps artillery was not a command, the searchlight platoon was attached to the corps headquarters, but it operated under the supervision of the corps artillery commander who was in effect a corps staff officer. This employment was based on the US Army practice of assigning a searchlight battery to corps artillery. However, ARVN artillery commanders above the battalion level, while having the title of "Commander", did not actually command. The ACTIV study entitled "Employment of Artillery in Counterinsurgency operations (U)", dated 25 April 1965, explains their actual relationship as follows: "The Chief of the RVNAF Artillery command stated that he influenced, 'not directly, but by making recommendations to the High Command, RVNAF, where they instruct major units to carry out actions.' Corps artillery commanders stated that they influenced employment by 'recommending to and advising' the corps commander and staff."

Corps employment of the platoon was patterned after the US Army procedure of attaching searchlight platoons to divisions. The platoon headquarters and the service and maintenance section were kept under corps control while the searchlight sections were attached to the divisions or special sectors within the corps area. This system did not prove completely satisfactory since the size of each corps area

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prevented the platoon leader from maintaining effective control over the platoon. Furthermore, since operations were planned and controlled by the divisions rather than corps, the platoon leader was not physically in a position to advise the division commander on the tactical employment of searchlights. The exception to this was on the night of 29 January when the platoon leader accompanied the 5th and 6th sections on an operation with the 21st Division.

Although each searchlight section was capable of independent operations, they were habitually employed in pairs. This was in accordance with the ARVN artillery practice of employing their artillery in 2-gun positions. It proved highly effective in assuring that illumination was available when requested and, that once started, the illumination of an area would be continuous until the termination of the mission even if one light malfunctioned. When employed in this manner, the senior section commander assumed command of both sections and the LDC's were combined into one element. One of these combined sections was usually attached to a division or special sector for employment.

There were three modes of employment: static, mobile, and a combination of the two. The static position method of employment was used in the Da Nang Special Sector, the Dong Nai Sensitive Area, and the 25th Division area. This method proved very effective in providing on-call illumination to outposts, hamlets, and small-scale operations such as ambush patrols. It permitted the establishment of fixed channels of communication through which illumination could be requested. The most outstanding example of this method was when it supported the Da Nang Special Sector. From a position located on top of hill 327, two light sections (1st and 2nd) provided direct illumination on 22 concentrations at ranges from 1,000 to 18,000 meters. Actual missions performed by these sections included the support of hamlets, outposts, night patrols, small-scale night operations, and illumination for the landing of equipment for the 9th US Marine Expeditionary Brigade. Illumination requests were made through the 211th Artillery Battalion in the same manner as normal artillery fire requests which were in turn forwarded by the battalion FDC to the LDC by telephone or radio. On 11 of the 22 missions, the VC were reported to have ceased action or to have dispersed when illumination was placed on their positions. Of the remaining 11 missions, the VC broke contact after searchlight illumination and fire power were both used. The major disadvantage of the position on hill 327 was that on three consecutive nights, 2, 3, and 4 March 1965, the light positions were shrouded in fog. Attempts to use the searchlights during these periods proved futile.

At the opposite end of the scale was the mobile employment used in the 1st, 2nd, and 9th ARVN Divisions. These units used the light strictly in support of division operations. When an operation was planned the lights were moved into a position from which they could support it. When the operation terminated the lights moved back to

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their home compound and were not employed until the next operation. This method of employment gave maximum support to the division night operations; however, it did not make maximum use of the searchlight. An example of the mobile employment in support of an operation can be found in annex G under the description of a 5th Infantry Regiment operation on 3 March 1965.

The most effective method of employment appeared to be a combination of the two mentioned above. This method was used by the 5th, 7th, and 21st ARVN Divisions. The lights were placed in permanent positions from which they could conduct illumination missions but, when needed for specific operations which they could not support from their permanent positions, they were moved to new positions from which they could provide support. When the operation terminated the lights were moved back to their primary positions. This method of employment followed the ARVN practice of employing artillery by individual tubes. It provided the most flexible use of the lights since they were available for targets of opportunity when not directly supporting unit operations. One disadvantage of this system was that when the lights were moved from their primary position in support of an operation, the area they normally supported had to rely on other light sources. Another possible disadvantage arose from using the lights from the same positions over an extended period of time. This could have invited VC attack. However, during the evaluation, lights were employed in the same position for as long as three weeks without being attacked by the VC.

#### 4. Illumination Planning

Illumination planning by higher headquarters was generally lacking due to inexperience in use of searchlights. With the exception of Da Nang Special Sector, all illumination plans were based on the concept of operations stated by the division artillery commander or the division G3 and were prepared by the supporting searchlight section commander. The plans were sketchy and consisted of a few concentrations selected from a map reconnaissance or based on previous knowledge of the areas of operation. Consequently, the illumination plans did not include all types of illumination and scheduled illumination was rarely used. Illumination was generally used for targets of opportunity or for on-call missions and, in many cases, the methods of requesting illumination were not thoroughly disseminated to supported units. Also, coordination of illumination with adjacent units was rarely ever undertaken. One result of this lack of coordination was that an ARVN Ranger unit was inadvertently illuminated by a concentration requested by a neighboring Regional Force unit just as the Rangers were beginning their assault on an objective. Fortunately there were no VC in the area. The paucity of planning for the employment of searchlights can be attributed to a lack of published doctrine on the employment of searchlights in counterinsurgency operations and to the fact that searchlight illumination was a completely new concept in the ARVN.

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## 5. Light Direction

Requests for illumination were handled through normal ARVN artillery fire request channels, since there was no requirement for additional personnel for the sole purpose of locating targets for illumination. When the platoon was in general support of hamlets and outposts, these requests came through the sector operations center and were approved by the sector chief. When the unit was in direct support of ARVN units, these requests came through the division artillery FSCC, or the FDC of the field artillery battalion supporting the unit in operation.

The ARVN LDC was set up in accordance with the doctrine contained in FM 6-115 and functioned in a manner identical to US Army LDC's. It consisted of a light direction officer, chart operator, computer, and radio telephone operator. Data on preplanned concentrations, based on information furnished by division artillery or the unit operations center, were preplotted on the light direction chart. Illumination requests reported by coordinates from forward observers were plotted using the coordinate scale. After completing the initial plot, the chart operator announced azimuth, range, and height for the illumination mission. The computer converted these data into commands and transmitted them to the searchlights by telephone. Subsequent corrections from the observer were also handled by the computer. Department of the Army Form 6-38, Computer's Record (Searchlight), was translated into Vietnamese and used in the LDC to record missions. Targets of opportunity were assigned a concentration number and the data retained for possible future use. These techniques proved adequate throughout the evaluation period.

## 6. Security

One of the major problems that confronted the ARVN commander when he considered employing searchlights was that of providing adequate security. The unit was not large enough to provide for its own security and at the same time perform its illumination mission, so it depended upon the attached unit to provide security for road marches and positions occupied by the searchlight sections.

During the field evaluation, the searchlight platoon traveled over 2,500 km on highways in the RVN. Where possible, the unit traveled as part of a larger convoy; however, this accounted for less than 10 percent of the moves. Normally, the unit being supported, to which the searchlights were attached, was required to provide movement security. The size of the security force varied from one Regional Force (RF) squad to as much as an ARVN company reinforced with armored cars and overflown by an observation aircraft. The size of the normal escort was one platoon of either ARVN, Rangers, or RF reinforced with armored cars.

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In selecting positions for the searchlight sections, primary consideration was given to the problem of security. In most cases, the permanent positions for the lights were located in the compound of the supported units. When the searchlights moved to the field locations to support specific operations, the sections were generally located with elements, such as command posts or artillery units, which provided the necessary security. This did not result in the most advantageous positioning of the lights. However, in many cases additional security could not be spared to establish a separate position for the searchlights and on at least two occasions the searchlights were not employed at all because supported units would not provide the necessary security.

## 7. Findings

a. Neither FM 6-115 nor FM 20-60 contain doctrine on the employment of searchlights in counterinsurgency operations.

b. Neither the ARVN commanders involved in the evaluation nor their US advisors had appreciable training or experience in the use of searchlights to provide battlefield illumination.

c. The test platoon consisted of the personnel and equipment necessary to accomplish its illumination mission to provide transportation and, to a limited extent, to perform administration, communications, and maintenance functions.

d. The platoon depended upon the units to which it was attached for most of its administration and all of its security.

e. When the platoon was under corps control the platoon headquarters was located at corps headquarters and the searchlight sections were separated from the platoon headquarters and located with and employed by the subordinate divisions.

f. On only one occasion during an operation was the platoon leader in a position to advise a division commander on the employment of searchlights.

g. Direct illumination was used most frequently during the evaluation.

h. Diffused and reflected illumination were used only occasionally during the evaluation.

i. Searchlights were habitually employed in pairs.

j. There were three modes of employment: Static, mobile, and a combination of the two.

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k. When the searchlights were employed in the static mode, illumination was readily available in response to requests by either ARVN or Regional Forces/Popular Forces.

l. When employed in the mobile mode the searchlights were in direct support; thus only the supported unit received illumination.

m. When employed in the static-mobile mode the lights were readily available for targets of opportunity when not in direct support of unit operations.

n. There was generally no illumination planning by corps or division headquarters.

o. Coordination of illumination with adjacent units was virtually non-existent.

p. Requests for illumination were handled through normal ARVN artillery fire request channels.

q. The ARVN light direction center was organized and operated in accordance with US Army doctrine as established by FM 6-115, dated August 1959.

r. On at least two occasions the lack of necessary security caused the searchlights not to be employed on operations.

## B. OBJECTIVE 2 - EQUIPMENT PERFORMANCE

### 1. Introduction

The six 30-inch searchlights used during the evaluation in the RVN were the first units delivered for field use. As evidenced by their serial numbers 27 thru 32, they were early production models. Each light was given a 12-hour reliability test prior to shipment to Vietnam. During the evaluation searchlights illuminated 218 concentrations during a total of 491 equipment-unit hours of searchlight operation (an equipment-unit hour of operation by 1 searchlight).

### 2. Searchlight Capabilities

#### a. General

The 30-inch searchlight was designed to deliver continuous light for 6 to 8 hours with minor supervision and adjustment. The system consisted of two major components: the 30-inch diameter reflector searchlight mounted on a trailer, and a gasoline engine driven generator on a second trailer. The searchlight had a beam rating of about 400,000,000 candlepower at the light. Gasoline consumption of the generator

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during the evaluation was close to the rated seven gallons per hour given in the technical publications. Exact gasoline consumption could not be recorded since resupply was accomplished from 55-gallon drums and no measuring devices were available to the platoon. Electrode usage also conformed to the technical publications, i.e.,  $3\frac{1}{2}$  positive electrode rods per hour and one negative electrode disc per six to eight hours. The rated capabilities of the light are shown in figure 4.

<u>Beam Spread</u>	<u>Maximum Usable Range (Meters)</u>	<u>Width of Area Illuminated (Meters) At Three-Quarters Maximum Usable Range</u>		
		1 Light	2 Lights	3 Lights
Focus Beam (52 mils)	9,100	450	850	2,475
Spread Beam (180 mils)	8,900	1,800	3,300	9,000

(U) FIGURE 4. 30-inch searchlight capabilities (FM 20-60).

Information in figure 4 was taken from FM 20-60 with the exception of the widths of the areas illuminated by two searchlights, which were interpolated from the figures for one and six lights. (Note: The 30-inch searchlight has recently been type classified as Standard A and replaces the 60-inch searchlight which is now Standard B).

## b. Range

The maximum range of the 30-inch searchlight listed in FM 20-60 is 9,100 meters for direct illumination using a focused beam. On many occasions during the evaluation this range was exceeded and on two occasions it was doubled when two lights were employed on a hill 327 meters high. On the night of 27 February, from their position on top of hill 327 located near Da Nang, the 1st and 2nd sections illuminated Cam Le Bridge on National Route No. 1 near the district town of Dien Ban (BT062587) at a range of 18,300 meters. Troops manning the outpost at the bridge reported that they could see approximately 300 meters when the area was illuminated, as compared with approximately 10 meters before illumination. This was achieved even though a light rain was falling at the searchlight position. A short time later another bridge at a range of 17,000 meters located near the district town of Dai Loc (AT915580) was illuminated with similar results. These results were attributed to the searchlight's being located on top of the hill and being able to place direct illumination down onto the target area.

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which was located only a few meters above sea level.

On 1 February, while stationed at Soc Trang, the 5th and 6th sections illuminated an outpost near the town of Tan Hung (XR177635) at a range of 12,000 meters. The outpost defenders reported that they could see approximately 1,000 meters in all directions. The lights enabled them to accurately adjust artillery fire and stop a VC attack. The searchlights and the outposts were located at approximately the same altitude and were separated by dry rice paddies. On five other occasions the maximum rated range of the light was exceeded with favorable results reported.

## c. Mobility

As stated previously, the searchlights traveled more than 2,500 kilometers on Vietnamese roads during the evaluation. Because of the constant threat of attack ARVN units generally drove at speeds between 60 to 80 kilometers per hour. This coupled with the fact that most roads in Vietnam are rough and poorly maintained, had an adverse effect on the searchlights. The failure of the airvane switches, spring shock absorber, and arc viewing windows described in the appendix to annex E are directly attributed to the speed of march and conditions of the roads. In addition, numerous screws and bolts were jarred loose and lost, a caster wheel was lost from one light, and the positive sensing cells of all lights required adjustment after each move. Several requests were made by the members of the training team and the ACTIV evaluator to reduce the rate of march but these were of no avail. The fact that the ARVN crew members checked and tightened screws and bolts at every halt did not prevent loss. These problems did not occur with the generator.

The searchlights also traveled more than 1,600 kilometers by sea and 800 kilometers by air. These movements were accomplished without incident or harm to the searchlights or generators. Movement of the equipment by helicopter was discussed by ARVN but was not attempted during the evaluation. The searchlight and generator can be carried as external loads by helicopters.

## 3. Preference for Searchlight Illumination

Interviews with ARVN commanders, forward observers, and US advisors revealed that searchlights delivering direct illumination proved adequate for combat operations at ranges in excess of the rated maximum and that the lights were preferred to other means. The people interviewed had experience with at least one and, in several cases, all of the other types of illumination. Reasons for preferring searchlights were:

- a) The stability of the light on the target area, as opposed to flares which may oscillate or drift while suspended from a parachute.

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- b) The capability to provide continuous illumination which artillery or aircraft could not provide.
- c) The rapid and accurate adjustment of the searchlight, which was more responsive to the needs of the ground commander.
- d) The requirement for considerably less logistical support to operate the searchlight.

## 4. Part Failures

A total of five Equipment Improvement Recommendation (EIR) forms were submitted during the evaluation. A complete list of equipment faults disclosed during the evaluation, together with suggested corrective action, are shown in annex E. One item on which an EIR was submitted, the failure of an elevation brake shoe, proved to be caused by improper adjustment of the spacer block by the operator and will not be discussed. The part failures which adversely affected the operation of the searchlight or those for which an EIR was submitted were:

- a) The airvane switch was unreliable and could not withstand the shock of high speed road travel and sustained operations in Vietnam.
- b) The spring shock absorber, which is used as a travel lock to keep the lamp drum assembly from moving vertically while the searchlight is being towed, did not withstand high speed movement over the Vietnamese roads.
- c) All six of the original control box cables failed because of broken internal wiring.
- d) The dowsers and its interlock circuit did not endure under sustained field operations and did not effectively hide the arc afterglow.
- e) The upper and lower contact inserts of the positive rod electrode head assembly failed to maintain their alignment during operations.
- f) Four glass arc viewing windows were cracked by vibration and shock during high speed road marches.

## 5. Findings

a. When the searchlights were employed in pairs, the range of illumination provided by the searchlights often exceeded the maximum range stated in FM 20-60 for a single light and on two occasions ranges achieved were double the stated maximum.

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b. The searchlight sets possessed adequate road mobility for employment in Vietnam.

c. Routine high speed movement over Vietnamese roads caused damage to certain parts as well as excessive wear and tear to the entire searchlight system.

d. Vietnamese commanders and their US advisors supported by searchlight illumination compared it favorably with other means of battlefield illumination.

## C. OBJECTIVE 3 - EQUIPMENT VULNERABILITY

This objective was established to evaluate the vulnerability of the searchlights to enemy action in an insurgency environment. The objective was not met because no enemy action was directed against the searchlights during the evaluation. On only one occasion, however, enemy fire was directed into the general area occupied by the searchlights. That incident occurred at Duc Hoa during the night of 9 January 1965 when enemy small arms fire was directed into the ARVN 25th Division compound where the searchlights were located. When the firing started the searchlights were not in operation. When the lights were used to illuminate the area from which the enemy fire came, the VC firing ceased. Neither the searchlights nor generators were hit by this fire.

## D. OBJECTIVE 4 - MAINTENANCE AND LOGISTICS PROBLEMS

### 1. Maintenance Training

The major problem affecting the employment of searchlights in Vietnam was one of maintenance training. Since the 30-inch searchlight was a new piece of equipment, and the six lights sent to Vietnam were the first lights to undergo field use, a special team was trained by the US Army Engineers Research and Development Laboratory (ERDL) to instruct the Vietnamese in operation and maintenance. This team consisted of one officer and six NCO's selected by DA. The NCO's were all experienced in operation and employment of the 60-inch searchlight. However, they had never seen a 30-inch searchlight prior to their arrival at Fort Belvoir and did not have a background in maintenance. The officer had no prior experience with searchlights but had an engineering background which enabled him to absorb the instruction quickly. He was also experienced in artillery techniques. This instruction by ERDL consisted of a 10-day course in all levels of maintenance on the 30-inch searchlight. This proved adequate to qualify them as mechanics but was not adequate to thoroughly qualify them as instructors.

Upon their arrival in Vietnam the training team conducted a three week course of instruction for the members of the ARVN searchlight platoon. This instruction consisted of 15 hours of operation of the searchlight,

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12 hours of section drill, 18 hours of light direction center procedures, 12 hours of selection and occupation of positions, 27 hours of preventive maintenance, and 19 hours of operational exercise. At the end of this period of formal instruction, an additional one week review of maintenance procedures was conducted for all personnel. The ARVN officers and EM who received this instruction were all field artillerymen with the exception of six engineer mechanics who were attached to the platoon from the 40th Engineer Depot. Some difficulty in translating technical terms from English to Vietnamese was encountered during the training. This was due primarily to a lack of knowledge of electrical circuitry by the members of the ARVN platoon. Upon completion of the training the platoon still relied on the training team to accomplish most of the repairs necessary on the equipment.

Upon deployment of the platoon to the field, one NCO from the training team and one ARVN engineer mechanic were assigned to each searchlight section to assist the crew members in maintaining the equipment. However, the majority of all repairs were eventually performed by the US Army NCO's. Items that could not be repaired by the NCO's were repaired by the officer in charge of the team. Some of the platoon personnel acquired a limited knowledge of repair techniques by working with the training teams. These individuals could repair most of the failures which they had seen repaired previously but when a new difficulty confronted them, they lacked the knowledge necessary to analyze and correct it. This led to a system of "hit and miss" maintenance rather than a systematic trouble shooting approach. Whenever a light failed the Vietnamese mechanic would start to replace parts that he thought were causing the difficulty. He would continue to replace parts until the difficulty was corrected or he had used all available parts. On many occasions this system proved successful in correcting the deficiency; however, this led to unnecessary replacement of parts. In a few instances, parts were replaced only to have the same parts fail again because the actual cause of the trouble had not been corrected.

On 29 and 30 March 1965 three inoperative searchlights and their generators were airlifted by USAF C-123 from Da Nang to Saigon. These lights had been deadlined since 16, 18, and 25 March respectively, and were beyond the capability of the platoon to repair. Upon arrival in Saigon, the lights were turned over to the 40th Engineer Base Depot. The only depot mechanics who had any knowledge of how to repair the searchlights were the six who were attached to the platoon. Since these mechanics had not received any more instruction than the platoon, the US advisor to the depot recommended that they not attempt to repair the lights. On 12 April, the Director, CDTC-V, requested that one of the deadlined lights be brought to his shops to determine if his engineers could perform the necessary repairs. By 16 April the one light was repaired. The primary repair work was done by an ARVN Signal Corps Captain assigned to CDTC-V, who, although he had no prior experience with searchlights, had an extensive background in electrical engineering.

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This officer also repaired the other two deadlined lights, plus a fourth light that had become inoperative after the platoon returned to Saigon. (Note: A complete translation into Vietnamese of technical data related to both the 30-inch searchlight and the 20 kw generator is in process and will be forwarded to the ARVN at the earliest possible date.)

## 2. Repair Parts

The MACV request for the shipment of searchlights to Vietnam called for the items listed in TOE 6-558D that were necessary to equip an ARVN searchlight platoon. Department of the Army replied that they would ship six new Standard A 30-inch searchlights in lieu of the Standard B 30-inch searchlights listed in TOE 6-558D. The substitution was made to insure the availability of repair parts; and Table of Organization and Equipment 6-558E, which was published after the MACV request was submitted, included the 30-inch searchlight.

In order to insure that sufficient repair parts were available in Vietnam throughout the training period and the field evaluation, MACV requested the immediate shipment of a six-month supply of repair parts. Each searchlight arrived in Vietnam with an overpack of repair parts designed for 90 days maintenance. The remaining repair parts did not start arriving in Vietnam until 26 January 1965 and a complete set of repair parts was never received. A check conducted in January 1965 revealed that of a total of 79 items, only 19 items for the searchlights were in depot stock in CONUS, 4 additional items were available at the contractor's plant, and the remaining 56 items were not in the supply system and had to be ordered. All available parts were shipped to Vietnam on a priority basis. By the completion of the evaluation, a total of 137 items had been received, including the overpacks. A complete list of all repair parts received during the evaluation is shown in annex F.

The shortage of repair parts caused lights to be deadlined in three cases. On 6 January 1965, one of the two lights located with the ARVN 25th Division located at Duc Hoa was deadlined for the lack of a replacement dowsing solenoid. On 8 January, one of the lights supporting the Dong Nai Sensitive Area was deadlined for lack of a striker solenoid. Neither of these items were included in the overpack and both lights remained deadlined for the rest of their stay in III Corps. On 20 January, prior to moving to IV Corps, one of the two lights was repaired by taking the required part from the other. A special request was sent to CONUS on 11 January requesting that replacement parts be airmailed to Vietnam. The parts arrived in Vietnam on 26 January and the remaining light was repaired on 29 January 1965. These two lights were deadlined a total of 35 days. On 3 February 1965 one additional dowsing solenoid was received as part of the additional shipment of repair parts. No additional striker solenoids were received during the evaluation period.

The third case involved one of the lights located at Phu Bai in

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support of the 1st ARVN Division. The light had been operating without a negative forward limit switch (S-21) since 6 February when a short circuit caused the original switch to be burned by the arc. In addition, the light had a short circuit which neither the crew nor the training team were able to locate. On 1 March, while the maintenance personnel were attempting to determine the cause of the short circuit, the negative carbon came in contact with the positive head assembly causing the inner and outer air nozzles, auxiliary reflector, and dowsers to be burned. All parts were replaced, but since this was the last of the six auxiliary reflectors provided in the repair parts, the light was deadlined until an S-21 switch could be obtained to prevent a recurrence. There were no S-21 switches shipped with the repair parts, so it was necessary to fabricate five switches. These switches were fabricated by the ARVN Combat Development Test Center, Vietnam (CDTC-V) work shop and the switches performed satisfactorily throughout the remainder of the evaluation.

In addition to the S-21 switches, two other items, spring shock absorbers and an elevation brake shoe, were repaired or fabricated by ARVN depots. Three shock absorbers were repaired by welding the pistons back onto the piston rod. An aluminum brake shoe was cast by an ARVN depot to replace one that broke during operation. Neither of the two items caused the lights to be deadlined. Several other small deficiencies, such as a missing caster wheel, broken arc viewing windows, broken viewing window covers and arc image screen covers, and a cracked searchlight circuit breaker, were left unrepaired because parts were not available. None of these items caused the lights to be deadlined.

### 3. Logistics System

Under normal conditions, maintenance support for 30-inch searchlights would have come from an ARVN engineer field maintenance company organic to each of the four corps area logistic centers (CALC). Backup support for the field maintenance companies would be provided by the 40th Engineer Base Depot located in Saigon. However, since the searchlight platoon was scheduled to be in each corps area for a period of only three weeks to one month, it was not practical to train and equip each of the field maintenance companies to support the lights during such short periods. In addition, the limited number of spare parts on hand would have required the transfer of the parts to a new field maintenance company each time the platoon moved to a new corps area. To solve this problem, six engineer mechanics were attached to the platoon from the 40th Engineer Base Depot for the duration of the evaluation. Since these people had no prior training in searchlight maintenance they received instruction from the US Army training team along with the members of the searchlight platoon. As stated previously, this training proved inadequate.

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Resupply of repair parts was accomplished by direct issue to the platoon. Since the searchlight sections were scattered throughout the corps areas and movement between the platoon headquarters and the sections at times was all but impossible, the engineer mechanics and the spare parts were further allocated to the sections.

Rations were no problem during the evaluation. The platoon was paid a ration allowance each month for the purchase of food, which is normal procedure for all units in the ARVN.

Petroleum, oil, and lubricants (POL) used by the platoon during the evaluation were furnished from the allocation to the corps artillery to which the platoon was attached. The only problem that developed in this area was a lack of antifreeze for the searchlight cooling system. This system required 58 1/2 ounces of antifreeze in the head exchanger. However, during the evaluation it was necessary to add some water to the system to replenish losses of antifreeze incurred while changing head assemblies. A 55 gallon drum of antifreeze was shipped from CONUS in December 1964, but did not arrive in Vietnam during the evaluation. The use of water in lieu of antifreeze in the searchlight cooling system is an emergency field expedient. However, there is an appreciable increase of the normal operating temperature of the light from a normal maximum of 200 degrees Fahrenheit to 225 degrees Fahrenheit at which time a thermostatic switch automatically shuts off the power to the electrodes. This increased operating temperature level has a general chronic effect to shorten the life of component parts and should be avoided whenever possible.

#### 4. Deadline Rate

In addition to the 42 deadline days spent for lack of repair parts, the searchlights were deadlined for 136 equipment-unit days for other causes. Based on a total of 756 (126 x 6) equipment-unit days during the evaluation, this total 178 deadline days amounted to an overall deadline rate of just under 24 percent. It was noted that 107 deadline days occurred after the departure of the training team. This amounted to a deadline rate of just under 39 percent during the last 46 days of the evaluation. Because of the lack of qualified mechanics with the platoon the deadline rate may have been even higher had the ARVN continued to employ the searchlights. Prior to the departure of the training team the deadline rate for the searchlights was just under 15 percent. This included the time spent awaiting for repair parts. The deadline rate of the generators was negligible and amounted to less than one percent. A consolidation of the maintenance records kept by the platoon is shown in annex D.

#### 5. Findings

- a. Due to lack of technical background and training the platoon was

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incapable of adequately performing maintenance on the test equipment during the evaluation.

b. Equipment was deadlined for 42 days because of shortage of spare parts.

c. Antifreeze for the heat exchanger was not available during the evaluation period.

d. The overall deadline rate for the searchlights was just under 24 percent of the total equipment-unit days during the evaluation.

e. The deadline rate for the generator was less than 1 percent during the evaluation.

## E. OBJECTIVE 5 - FUTURE REQUIREMENTS IN RVN

### 1. Introduction

The introduction of additional field artillery searchlight units into Vietnam is desirable; however, it is neither practicable nor desirable for searchlights entirely to replace the other means of battlefield illumination now being used. Searchlight units can complement other capabilities of the ARVN in providing illumination for outposts, hamlets, installations and deployed troop units under attack or harassment by the Viet Cong.

Prior to the introduction of any additional 30-inch searchlights into Vietnam, a thorough training program should be conducted to train mechanics at all maintenance levels. Such a program should be developed and conducted by personnel who are well grounded in the theory of searchlight operation and maintenance and should include factory technical representatives. The first step should be to train the Vietnamese mechanics of the Base Depot and the maintenance instructors of the RVNAF Engineer School in 4th and 5th echelon maintenance. Working under the supervision of US personnel, these Vietnamese would then train the mechanics of the RVNAF Artillery School in 3rd and limited 4th echelon maintenance. Instruction of searchlight unit mechanics and crew members would then be performed by the instructors from the RVNAF Artillery School. This would insure that trained personnel were present at each level to handle maintenance problems. Operational training for future units could be conducted by a cadre from the present searchlight platoon.

An adequate supply of repair parts should be built up now to support the six searchlights already in Vietnam. This could be accomplished by shipping the balance of the 6-month supply of repair parts originally requested by MACV, plus a follow-on shipment of an additional 6-month supply. From this 1-year supply the Engineer Base Depot could develop a list from which to determine future requirements for repair parts.

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## 2. Proposed Organization

Figure 5 is a proposed organization chart for future ARVN searchlight units. A complete table of organizations is shown in annex H. This unit should be a field artillery searchlight battery consisting of three platoons of two searchlights each, plus a battery headquarters section and a service and maintenance section. The battery organization requires a total of 65 personnel, an increase of 3 over the original test platoon.

The battery headquarters section should consist of 10 personnel, an increase of 6 over the test platoon. The platoon sergeant should be replaced by a battery first sergeant and the following personnel should be added: One kitchen and mess NCO, one battery clerk, one typist, two cooks, and one additional radio operator/driver. The additional personnel are necessary to improve the administrative capability of the unit.

The service maintenance section should consist of seven men, an increase of three over the test platoon organization. The jobs of supply and motor NCO should be separated and a radio mechanic substituted for the radio operator. The following personnel should be added: One searchlight maintenance specialist and one supply clerk. These are necessary to increase the capabilities of the battery in the maintenance and supply fields.

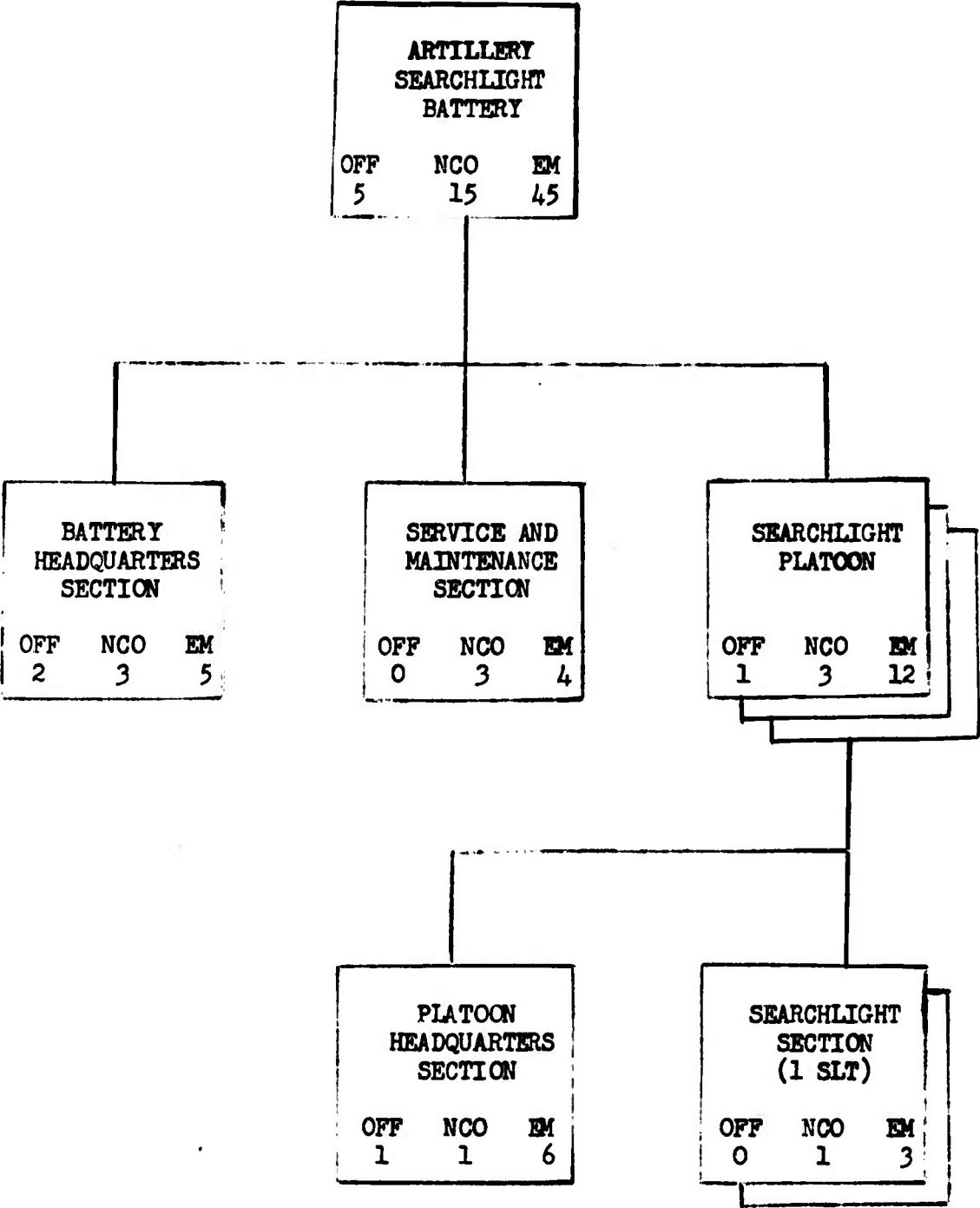
The searchlight platoon should consist of 16 personnel, including one officer as a platoon leader. The second in command would be the platoon sergeant who also would supervise the light direction center and operation of the lights. This would free the platoon leader to command as well as to act as liaison to the supported unit and place him in a position where he could advise the supported command on the use of searchlights. One of the two light direction centers (LDC's) used under the combined sections during the evaluation should be removed and the following personnel substituted: One platoon sergeant, one typist, and one additional radio operator/driver. Since the platoon would be acting on independent status the typist would be necessary to handle the administrative work. The only changes to the searchlight squads should be their redesignation as searchlight sections.

## 3. Deployment

The deployment of the proposed searchlight batteries should be one per corps. The battery should be assigned to corps artillery. Corps artillery should further attach the searchlight platoons to the divisions or special sectors within the corps area. When required, the battery could be massed and assigned to a specific division or sector to support a particular operation. In supporting unit operations, the searchlights should be employed in a position from which they could provide illumination for on-all concerned units and targets of opportunity in support of outposts and hamlets.

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(C) FIGURE 5. Organization chart, proposed ARVN searchlight battery.

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The present requirement for 30-inch searchlights in Vietnam is 28, organized into 4 batteries of 6 lights each. One platoon of two lights should be assigned to the RVNAF Artillery School for instructional purposes and two searchlight sets should be assigned to the RVNAF Engineer School for maintenance instruction. In the future, consideration should be given to expanding the number of searchlight batteries in Vietnam to one per division.

## 4. Doctrine

As stated previously no doctrine was contained in either FM 6-115 or FM 20-60 on the employment of searchlights in counterinsurgency operations. Tactics and techniques evolved during the evaluation came about through necessity rather than careful study and analysis. Doctrine for employing field artillery searchlight units in the counterinsurgency effort in Vietnam should be developed by the Artillery Command, RVNAF. In addition, the US Army Artillery School should develop doctrine for the employment of US Army searchlight units in counterinsurgency operations.

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## IV (C) CONCLUSIONS AND RECOMMENDATIONS

### A. CONCLUSIONS

It is concluded that:

1. The doctrine for employment of searchlights in counterinsurgency operations is inadequate.
2. The test platoon was adequately organized to provide illumination in support of counterinsurgency operations but requires reorganization and personnel augmentation to be administratively self-sufficient.
3. The test platoon could not provide for its own security and at the same time perform its illumination mission.
4. The static-mobile mode of employment provides the most effective use of searchlights in counterinsurgency operations in Vietnam.
5. The employment of searchlights in pairs increased the stated range considerably and is effective in Vietnam.
6. The employment of additional field artillery searchlight units in Vietnam is both feasible and desirable.

### B. RECOMMENDATIONS

It is recommended that:

1. A training team, including factory technical representatives, be sent to Vietnam to thoroughly train Vietnamese mechanics in maintenance of the 30-inch searchlight.
2. The remainder of the original 6-month supply of repair parts plus a follow-on of an additional 6-month supply be shipped to Vietnam for the six lights now in-country.
3. A stockage list of repair parts be developed from the usage factors on the original six lights.
4. Four searchlight batteries, consisting of six searchlights each, be organized in accordance with annex H of this report and that one battery be employed by platoon in each corps area in support of division missions.
5. One provisional searchlight platoon, consisting of two lights, be

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organized and assigned to the RVNAF Artillery School.

6. Two searchlight sets be authorized for the RVNAF Engineer School to be used for maintenance instruction.

7. The Artillery Command, RVNAF and the US Army Artillery and Missile School develop and exchange doctrine for the employment of searchlights in counterinsurgency operations

# CONFIDENTIAL

(U) ANNEX A

SETTING OF THE EVALUATION

1. ENVIRONMENT

The Republic of Vietnam (RVN) occupies a crescent-shaped area of about 67,000 square miles on the southeastern edge of the Indochina peninsula. Although only 45 miles wide at the 17th parallel, its demilitarized northern border with the Democratic Republic of Vietnam (North Vietnam), it has a seacoast of 1,500 miles on the South China Sea and Gulf of Siam, and western borders with Laos and Cambodia of about 900 miles. The land borders are poorly defined and drawn through difficult and inaccessible terrain.

a. Terrain

There are four distinct geographical regions: The highlands located in the north and central portion, the plateaus of the central highlands, the coastal plain, and the Mekong Delta in the south. See figure C-1.

The northern two-thirds of the RVN is dominated by a chain of broken mountains and rugged hills extending in a northwest-southeast direction and terminating on the northern edge of the delta plain about 50 miles north of Saigon, the capital. The area is characterized by steep slopes, sharp crests, narrow valleys, and dense vegetation. It is sparsely populated, mainly by primitive and nomadic tribes, and it contains few roads or trails.

The central highlands adjacent to the Laos-Cambodia border contain extensive plateau areas. Here, the mountains give way to more gently rolling terrain. The northern plateau is covered by almost impenetrable tropical forests and jungles, which often have two dense overhead layers of foliage at heights of about 40 and 125 feet. The southern portion is typical savannah country, with large open expanses covered by tropical grasses and open forests. This region is more heavily populated than the northern highlands and has more roads and trails.

The coastal plain, varying from 10 to 25 miles in width, extends from the 17th parallel to the Mekong Delta. At several places mountain spurs jut out to the sea, cutting the plain into a series of compartments roughly at Mui Dinh, Mui Ke Ga, Quang Ngai, Da Nang, and Hue, north of which the spurs become more frequent. The area is characterized by sandy beaches and dunes, backed up by rice fields, fertile areas, and marshes extending to the mountains. It contains many small cities.



(U) FIGURE A-1. Geographical regions, RVN.

ANNEX A

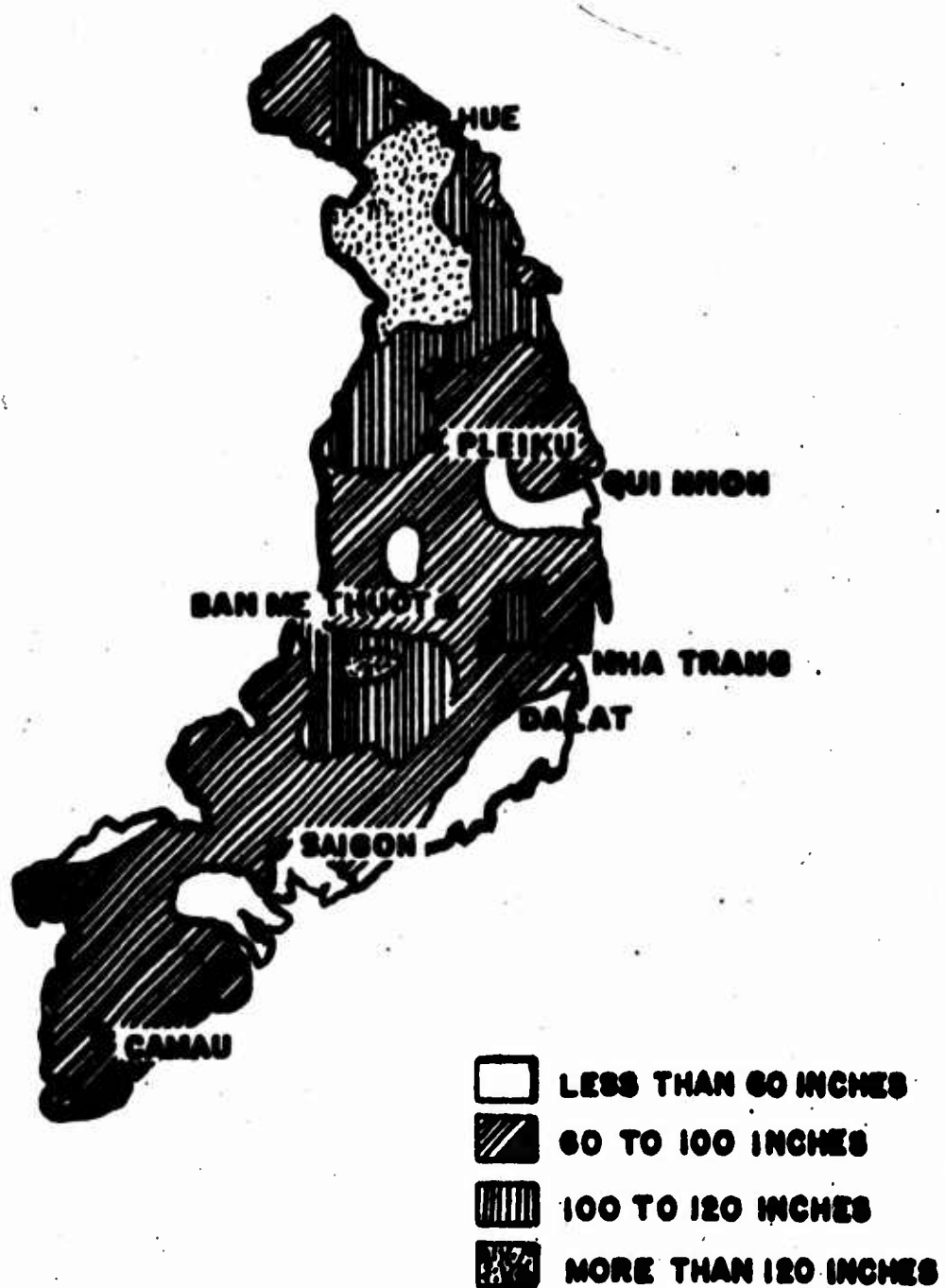
A-2

The southern third of the country is part of the large delta plain formed by the rivers Hau Giang, Mekong, Vam Co, Saigon, and Dong Nai. The Hau Giang flows directly to the South China Sea. The huge Mekong splits into four branches, and the Vam Co and Dong Nai enter the Saigon before reaching the sea. In addition to these major tributaries, the area is cut by a number of smaller streams and a dense network of canals. The plain is relatively flat with few points exceeding an elevation of 20 feet above sea level. It is a very fertile area with more than 9,000 square miles under rice cultivation. Drainage is effected chiefly by tidal action, with the difference between ebb and flood as much as ten feet in some areas. The southernmost tip of the delta, known as the Ca Mau Peninsula, is covered with dense jungles, and mangrove swamps stand at the shoreline and on river estuaries. The eastern portion of the delta plain is heavily forested. The Plain of Reeds, a large marshy area covered with tall reeds and scrub trees, is located in the center of the delta region adjacent to the Cambodian border. During the rainy season, a major portion of the entire area is inundated.

#### b. Climate and Weather

The climate is hot and humid, subtropical in the north and tropical in the south where the monthly mean temperature is about 80 degrees Fahrenheit. The annual rainfall is heavy in most regions and torrential in many. It is heaviest at Hue which has an annual average of 128 inches. The low of 28 inches at Mui Dinh, a small cape on the eastern coast some 62 miles south of Nha Trang, results from the presence of hills in the area. At Saigon, rainfall averages 80 inches annually. See figure A-2.

Seasonal alternation of monsoon winds profoundly influences the weather throughout the year, although geographical features alter patterns locally. The winter monsoon blows generally from the north-east from early November to mid-March and often brings floods to the northern portion of the RVN. This is the period of the dry season in the delta, which usually lasts from December through March. The winds begin to shift in March, and with the exception of the coastal plain, high temperature and humidity prevail in all of the RVN from April to mid-June. The summer monsoon blows generally from the southwest from mid-June to late August or early September, bringing to the delta region heavy and frequent rains, high humidity, tropical temperatures, and maximum cloudiness. Mountains cause clouds to pile up and deposit moisture before the clouds reach the coastal plain or the northern highlands, which areas are dry during this period. In September the winds begin to shift again, and the coastal plain receives its maximum amount of rain and cloud cover, including severe tropical storms and typhoons.



(U) FIGURE A-2. Annual precipitation, RVN.

### c. Communications

Roads throughout the RVN are few in number, poorly cared for, and narrow. Road travel to major areas in the north is often stopped completely when bridges and narrow places are destroyed, either by natural causes or the Viet Cong (VC). In the delta region, 2,500 miles of navigable inland waterways ease somewhat the communication burden placed on the 1,200 miles of primary and secondary roads in the region.

A single-track, narrow gauge railroad connects Saigon with the northern provinces by way of the coastal plain. The system and equipment are old and frequently damaged by the VC.

There is no wire telephone communication among the major centers of population. What radio telephone service is available is at the mercy of the often unstable atmospheric conditions over the RVN. Telephone equipment used in major cities is antiquated or makeshift.

In effect, rural areas are virtually isolated. It is not unusual for a VC act of terrorism or sabotage to take place in an outlying delta area and be reported in Saigon a week or more later. Most incidents accounted for take at least two or three days to get into the situation reports to Saigon.

### d. Population

The RVN has a population of approximately 15.7 million, with an average density of 234 per square mile. The highland region is generally the least settled of the geographic areas of the RVN, and the coastal plain contains the most people. About 90 percent of the people live on the 13 percent of the land best suited for rice cultivation: the delta and the small river basins of the coastal plain.

Racially, the population is composed of 85 percent ethnic Vietnamese, 6 percent Chinese (who have established a great influence on the economy of the RVN), 5 percent Montagnard (the nomadic aboriginal tribe people living in the highlands), 3 percent Khmer-Cham (of Cambodian descent), and 1 percent European, Indian, and other small groups.

Religiously, about 80 percent profess Buddhism, about 10 percent profess Catholicism, and the rest profess Muhammedanism, Hinduism, Protestantism, Cao Daism, or Hoa Haoism (two local sects).

Socially, there is an upper class composed of old mandarin families, landed gentry, government officials, professional men, intellectuals, clergy, and wealthy businessmen; an urban middle class of civil servants, teachers, and small businessmen; and a lower class, mainly composed of farmers, but with a growing group of urban workers. Mobility upward within the structure is possible but difficult, especially up from the lowest.

Vietnamese culture is based on traditional Chinese customs and has been profoundly influenced, especially among the upper class living in the cities, by the French. Most rural Vietnamese continue to follow the traditional way of life. The great divergence in racial, religious, social, and cultural structures has produced continued strife and tension among the people who belong to the various groups. There seems to be no evidence of a permanent stabilizing force available within the Vietnamese society to control conflicting elements.

The Vietnamese have a deep and traditional belief in destiny and man's inability to change the natural order of events. This concept, reinforced by religious beliefs, results in a high valuation of the virtues of stoicism, patience, and endurance. The Vietnamese are proud of their ethnic traditions and hold themselves superior to ethnic minorities in the RVN and to the peoples of neighboring countries.

Most of the people living in the countryside, who make up 90 percent of the population and who provide the main targets for the VC, care neither for the government in Saigon nor for the VC. They want to be left alone to grow their crops, raise their families, have a tranquil old age, and die traditionally.

## 2. MILITARY ELEMENTS

### a. Friendly

Units which were to employ searchlights during the evaluation were selected on the basis of the type of terrain they occupied. The I Corps Tactical Zone was selected as being typical of the coastal plain and the highlands. The III Corps Tactical Zone was selected because it occupied the transitional area between the highlands of the north and the lowlands of the south. The IV Corps Tactical Zone was selected in order to evaluate the searchlights in the rice paddy and swamp areas that make up the delta portion of the RVN. In addition, since both wet and dry seasons occurred at the same time in opposite ends of the country during the evaluation, I Corps provided the opportunity to operate during the wet season in the north simultaneously with operations in III and IV Corps conducted during the dry season in the south. (See figure A-3.)

#### (1) Units

While in I Corps Tactical Zone from 25 February to 26 March, elements of the searchlight platoon were attached to the ARVN 1st and 2d Divisions. While with the 1st Division from 25 February to 24 March, sections 3 and 4 operated in support of the 2d Infantry Regiment and the 3d Infantry Regiment. While with the 2d Division from 26 February to 25 March, the 5th and 6th sections operated in support of the 5th and 6th Infantry Regiments. The 1st and 2d sections, which remained under corps artillery control, were placed in direct support of the Da Nang Special Section which was responsible for the security of the Da Nang airfield.







While in III Corps Tactical Zone from 26 December 1964 to 20 January 1965, elements of the searchlight platoon were attached to the ARVN 5th and 25th Divisions. Sections 3 and 4 were attached to the 5th Division from 28 December 1964 to 19 January 1965 but were under operational control of division artillery. Sections 1 and 2 were attached to the 25th Division from 28 December 1964 to 19 January 1965 and were also under the operational control of the division artillery. Sections 5 and 6 remained under corps artillery control and were placed in direct support of the Dong Nai Sensitive Area which was responsible for the defense of Bien Hoa Airfield.

While in the IV Corps Tactical Zone from 22 January to 12 February, elements of the searchlight platoon were attached to the ARVN 7th, 9th, and 21st Divisions. Sections 3 and 4 were attached to the 7th Division from 22 January to 12 February and remained under operational control of division artillery in support of the 11th Infantry Regiment and Kien Hoa Sector. Sections 1 and 2 were attached to the 9th Division from 22 January to 12 February in direct support of Duc Ton Sub-Sector, Vinh Long Sector, and the 13th Infantry Regiment. Sections 5 and 6 were attached to the 21st Division from 26 January to 11 February and were under the operational control of the Division Artillery.

## (2) Missions

The mission assigned to the searchlight platoon was to furnish direct or indirect illumination in support of tactical night operations. In addition, it received missions during the evaluation to be prepared to support outposts and hamlets within the effective range of the light beam with on-call illumination.

### b. Enemy

It is a well-documented fact that the Communist apparatus in the RVN is an extension of the Communist party of North Vietnam, and that direction and materiel and personnel support is received from the North. Supreme authority in the VC political and military organization in the RVN is the Central Office South Vietnam located in Tay Ninh Province near the Cambodian border. Subordinate thereto are four military regions and one special zone (corresponding roughly to the capital area), each of which has a subordinate series of provincial, district, and village-commune party committees.

## (1) Units

The VC military forces can be divided into 3 operational categories: main force, local force (together about 35,000 troops), and militia units (60,000 to 80,000 soldiers). The main force consists of full-time units controlled by the military region. Local force units are controlled by province and district committees. They are well-organized

and the personnel are well-trained and well-equipped. Militia units are full- and part-time local armed groups responsible to district, village, and hamlet authorities. Personnel of these units are used frequently as intelligence gathers, porters, or as reinforcements for main and local force units. They may replace losses in the local force.

A VC battalion is planned for 400 to 500 men, but in reality may consist of as few as 250. A company averages 100 men and a platoon about 30. Personnel may be acquired voluntarily, by kidnapping, or by impressment using blackmail or threats of violence. There is evidence that large numbers (a total of about 45,000 in four years since 1960) of native-born North Vietnamese have infiltrated from North Vietnam through Laos into the RVN.

Viet Cong forces are in general lightly equipped and have a commensurate degree of cross-country mobility. In addition to individual weapons, they have a large number of automatic weapons and light crew-served weapons. The larger units are equipped with mortars and recoilless rifles. Supplies are obtained through capture, local procurement, taxation, and infiltration. Food staples such as fish, rice, and manioc are readily available.

## (2) Capabilities

Because of support rendered by the country people, familiarity with the area, lack of responsibility for life and property, and the nature of guerrilla organization, equipment, and tactics, the VC are able to move virtually at will throughout much of the RVN. They are able to exploit as necessary the differences in race, religion, class, economic condition, and cultural background of their targets. They have a well-developed intelligence system, good discipline, and a usually effective security system.

Viet Cong military operations have the advantages of speed, surprise, deception, and infiltration. Training, accomplished in small, local areas by well-indoctrinated cadre, probably emphasizes selection of the most vulnerable targets, night operations, movement as small units until concentration is required, terrorism and propaganda, use of weapons, employment of terrain and weather, and infiltration. The VC objective is not, at the present stage of their insurgency, to hold terrain, but rather to inflict losses on government forces, to capture weapons and materiel, and to convince the people that the government in Saigon cannot protect them and will eventually be defeated.

## (3) Limitations

Viet Cong limitations stem from their need for strong security and the largely clandestine nature of their activities. Although the people among whom they live afford them a high degree of

protection, active and passive, force must often be used, and support based on threats and fear endures only as long as pressure is brought to bear. Primitive living conditions add to the strain of avoiding government troops until the right moment. The VC are vulnerable to air and artillery attack, and less so to armor attack. Limited logistical capability, lack of communications, and insufficient medicine are other weaknesses.

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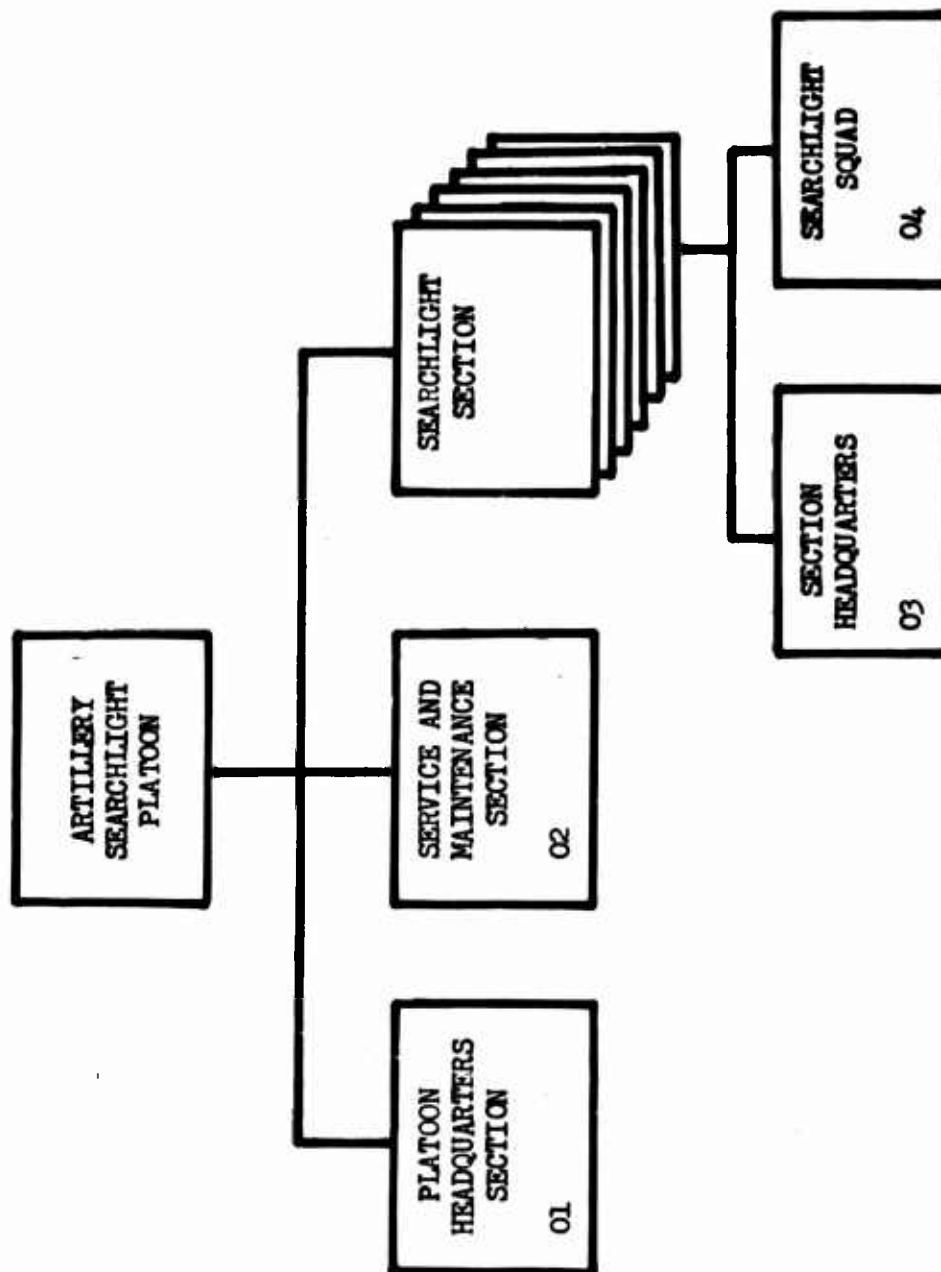
(C) ANNEX B  
TABLE OF ORGANIZATION AND EQUIPMENT  
FIELD ARTILLERY SEARCHLIGHT PLATOON  
(PROVISIONAL)  
ARMY OF THE REPUBLIC OF VIETNAM

1. MISSION. To furnish direct and indirect illumination in support of tactical night operations.
2. ASSIGNMENT. Assigned to corps artillery.
3. CAPABILITIES.
  - a. The platoon can provide mobile battlefield illumination for the area of one division under normal conditions.
  - b. The platoon can provide organizational maintenance of organic equipment.
  - c. The platoon can provide a communications system for control of organic searchlights.
  - d. The platoon is dependent upon higher or supported headquarters for survey and observation.
  - e. Individuals of this platoon can engage in effective, coordinated defense of the unit's area or installation.
4. BASIS OF ALLOCATION. As prescribed by J3 RVNAF High Command for test.
5. MOBILITY. One hundred percent mobile.

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PART I  
(C) ORGANIZATION CHART



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PART II. (C) ORGANIZATION AND PERSONNEL DISTRIBUTION

Section	Lane Item	DESIGNATION	Classification	Branch	MOS	Full Strength		OFFICER								NCO				E1				Remarks
						Military	Civilian	General	Colonel	Lt Col	Major	Captain	1st Lt or 2d Lt	Sgt Maj	P/Sgt	1st Sgt	Sergeant	Cpl/1	PVT/1	PVT				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
01	01	PLATOON HQ SECTION				1						1											1st Lt assigned	
	02	Platoon Leader				1																		
	03	Executive Officer				1							1											
	04	Platoon Master/Sergeant				1													1					
		Radio Operator/Armorer				1																		
		SUB TOTAL				4						1	1			1			1					

B-3

ANNEX B

CONFIDENTIAL

CONFIDENTIAL

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
02	SERVICE AND MAINTENANCE SECTION																						
01	Supply and Motor NCO																						
02	Signal NCO																						
03	Mechanic																						
04	Voice Radio Operator/Driver																						
	SUB TOTAL																						
03	6 SEARCHLIGHT SECTION HQS																						
01	Squad Leader																						
02	Computer																						
03	Chart Operator																						
04	Electrical Technician																						
05	Voice Radio Operator/Driver																						
	SUB TOTAL																						
04	6 SEARCHLIGHT SQUADS																						
01	Squad Leader																						
02	Searchlight Operator																						
03	Electrician/Driver																						
	SUB TOTAL																						
	TOTAL																						

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## PART III. (C) EQUIPMENT

1	2	3	4	5	6
Description	Plat Hq Section	Svc and Maint Sec	Searchlight Hq	Sec Sqd	Remarks
<u>Ordinance</u>					
Truck, 1/4 ton	1				
Truck, 3/4 ton		1	6	6	
Truck, 2 1/2 ton		1	1		
Trailer, 1/4 ton	1				
Trailer, water		1			Not issued
Carbine, M-1	1	3	18	6	
Pistol, cal .45	2				
Rifle, automatic (BAR)				6	
Rifle, cal .30 M-1		1	6	6	
Submachinegun (Thompson)	1		6	6	
Bayonet, w/scabbard	1	4	30	24	
Binocular, 7 x 50	2		6		3 issued
Aiming Circle	1		6		
Firing Set, Artillery			6		
<u>Engineer</u>					
Compass, lensatic	2		6		
Electric repair set, No.2		1			Not issued
Light, command post	1				
Searchlight, 30-inch				6	
Flashlight, MX991/U	3	3	12	6	
Generator, 19.5 kw				6	
<u>Quartermaster</u>					
Cook set		1			
Panel Set, signal		1			
Axe, wood cutting 1 kg 8	1	1		6	
Pick, w/handle	1	1		6	
Shovel, D handle	2	2	6	12	Not issued
Table, folding, field	1	1	6		
Chair, Folding, field	2	2	12		
Tent, command	1				
Tent, w/side	1	1	6	6	
Typewriter	1				
Saw, 2 man		1	6		
Tool Set, repair		1			
Can, gas, 5 gal	2	4	12	12	

B-5

ANNEX B

CONFIDENTIAL



# CONFIDENTIAL

1	2	3	4	5	6
Description	Plat Hq Section	Svc. and Maint. Sec	Searchlight Hq	Sec Sod	Remarks
<u>Quartermaster (cont)</u>					
Nozzle, gas can	1	1	6	6	
Can, water, 5 gal		4	6	12	
Drum, 55 gal		2		6	
Belt, utility TE 33	1	1	6		
<u>Signal</u>					
Radio, AN/VRC-9		1			
Radio, AN/VRC-34	1				
Radio, AN/PRC-9		1	6		AN/PRC-10 issued
Switchboard, SB 22/PT		1			
Telephone EE8	2	2	12		
Antenna RC 292		1			
Wire, electric WD 1	1	1	6		
Reel, RL 27	1	1	6		

ANNEX B

B-6

# CONFIDENTIAL

(U) ANNEX C

CHARACTERISTICS OF THE SEARCHLIGHT AND GENERATOR

1. SEARCHLIGHT

a. Searchlight, Less Trailer

Manufacturer	The Strong Electric Corp
Serial Numbers	27, 28, 29, 30, 31, 32
Part Number	Corps of Engineers 13202E001
Federal Stock Number	6230-712-5620
Type	Carbon Arc
Positive rod electrode burn rate	3½ electrodes per hour
Negative disc electrode burn rate	1 electrode per 6 to 8 hours
Carbon arc current requirements	Approximately 600 amperes starting surge, 190 to 200 amperes after start
Carbon arc voltage requirements	Upon starting, 110 volts, running 78 ± 2 volts
Peak beam candlepower	400,000,000 minimum
Total lumens	310,000
Focus beam width	52 mils (3¼ degrees)
Spread beam width	180 mils (10 degrees)
Cooling system capacity	58½ ounces, military anti- freeze

b. Trailer

Manufacturer	The Strong Electric Corp
Part Number	Corps of Engineers 13204E8590
Type	Two Wheel

c. Shipping Dimensions and Weight

Overall length	80½ inches
Overall width	74½ inches
Overall height	69½ inches
Operating weight (including trailer)	1,180 pounds

2. GENERATOR

a. Electric Generator Set

Manufacturer	Hol-Gar Manufacturing Corp
Serial Numbers	33, 34, 35, 36, 37, 38,
Make	CE-856-PM/WKI
Part Number	13204E7590
Federal Stock Number	6115-837-6773
Type	Permanent magnet
Duty	Continuous
Mounting	Skid base, trailer mounted
Housing	Canvas covered
Batteries (2)	12 volt each

b. Engine Assembly

Manufacturer	Continental Motors
Model	PC-60-8, Spec 30
Part Number	13204E7996
Type	4 cylinder, gasoline over- head valves
Cylinder Alignment	Horizontal opposed
Fuel Consumption (approx)	7 gal per hr

Rated Power (at 2400 RPM)	70 hp
c. <u>Electric Generator</u>	
Manufacturer	Hol-Gar Mfg Corp
Part Number	13204E7712
Type	Rotating field w/perm magnet excitation
Power Output	20 kw
Phase	3
Operating Voltage	Approximately 80 volts
Operating Current	Approximately 200 amps
Speed	2400 rpm
d. <u>Trailer</u>	
Manufacturer	Hol-Gar Mfg Corp
Type	2 wheel
e. <u>Shipping Dimensions and Weight</u>	
Overall Length	127 inches
Overall Width	74 inches
Overall Height	70 inches
Dry Weight	2,500 pounds

(U) ANNEX D  
EQUIPMENT MAINTENANCE RECORDS

<u>Date Service Performed</u>	<u>Remarks</u>	<u>Deadline</u>
<u>Searchlight No. 1, USA 8C5789, serial No. 29</u>		
28 Dec 64	Removed shock spring assy	None
5 Jan 65	Replaced inner air nozzle, positive feed motor (B-5), and striker test switch (S-11)	12 hrs
6 Jan 65	Dowser solenoid (L-1) inoperative	20 days
9 Jan 65	Replaced control box cable	None
20 Jan 65	Inspection of searchlight, removed striker solenoid (L-2)	None
29 Jan 65	Installed new dowser (L-1) and striker (L-2) solenoids	16 days
14 Feb 65	Replaced negative forward feed relay (K7) and arc blowout sensing cell (CR-3) and adjusted positive protrusion sensing cell	None
16 Mar 65	Searchlight fails to strike	31 days

P-1

ANNEX D

ANNEX D

16 Apr 65	Rebuilt control box wiring and adjusted striker switch (S-10) and striker test switch (S-11)	Repaired by CDTC-V	None
<u>Searchlight No.2, USA 8C5813, serial No.28</u>			
6 Jan 65	Replaced negative short carbon cut off switch (S-9)	Switch failure	2 hrs
8 Jan 65	Replaced striker switch (S-10)	Failure in interlock circuit	1 hr
10 Jan 65	Replaced arc blowout relay (K-9)	Relay caused light to cut off	
11 Jan 65	Replaced airvane switch (S-3) Replaced control box cable	Faulty switch	36 hrs
13 Jan 65	Replaced contactor relay (K-2)	Points overheating and sticking	None
22 Jan 65	Replaced inner and outer air nozzles	Burned by arc	None
24 Jan 65	Replaced negative forward feed relay (K-7)		12 hrs
25 Jan 65	Lens cover broke off arc image device and elevation brake hydraulic pump lost pressure	No replacement for lens cover or elevation pump	None
27 Jan 65	Replaced inner and outer air nozzles	Burned by arc	30 min
3 Feb 65	Replaced positive protrusion sensing cell cover, had left stoplight bracket welded	Cover came off during road march, stoplight bracket was cracked	None
8 Feb 65	Welded parking stand support and replaced grease fitting	Damaged during road march	None

10 Feb 65	Removed shock spring assembly	Piston rod separated from piston head	None
18 Mar 65	Searchlight failed to strike	No voltage when the start button was pushed	33 days
21 Apr 65	Replaced positive short carbon cutoff switch (S-8), replaced airvane switch (S-3), clear cooling system, adjusted negative short carbon interlock switch (S-14), repaired broken wire in control box, and repaired ammeter (M-1)	Repaired by CDTC-V	None

Searchlight No. 3, USA 8C5787, serial No. 27

27 Dec 64	Replaced inner air nozzle and adjusted positive protrusion sensing cell (CR-2)	Nozzle bent	1 hr
28 Dec 64	Repaired broken wire in control box cable	Voltage meter did not work	2 hrs
31 Dec 64	Repaired broken wire in control box cable	Searchlight failed to strike	2 hrs
2 Jan 65	Tightened wheel bearing on searchlight trailer		None
11 Jan 65	Repaired broken wire in control box cable	Searchlight failed to strike	2 hrs
12 Jan 65	Replaced control box cable		26 hrs
16 Jan 65	Replaced dowser	Burned by arc	None
6 Feb 65	Replaced negative forward feed relay (K7)	Negative disk moved improperly	None

ANNEX D

17 Feb 65	Replaced auxiliary reflector	Reflector burned	None
28 Feb 65	Replaced inner air nozzle	Burned by arc	None
5 Mar 65	Replaced negative rotation motor (B-4) and negative forward feed relay (K-7)	Disk did not turn properly	12 hrs
12 Apr 65	Anti-freeze leaks from positive head assembly		10 days
22 Apr 65	Replaced positive head assembly, clear cooling system, adjusted positive protrusion sensing cell (CR-2), rebuilt control box wiring	Repaired by CDTC-V	None
<u>Searchlight No. 4, USA 8C5820, serial No. 30</u>			
28 Dec 64	Replaced positive head assembly, arc off switch (S-19) and repaired three broken wires in control box cable	Positive head assembly leaking anti-freeze, light would not shut off when stop button was pushed	4 hrs
29 Dec 64	Replaced negative reverse feed (K-6), negative forward feed (K-7) and the positive cycling (K-8) relays and inner air nozzle	Negative drive motor would not cycle, positive drive motor would not cycle	2 hrs
1 Jan 65	Replaced inner air nozzle	Burned by arc	20 min
4 Jan 65	Replaced auxiliary reflector, and inner and outer air nozzles	Burned by arc	None
7 Jan 65	Replaced inner air nozzle	Burned by arc	20 min
11 Jan 65	Replaced inner air nozzle	Burned by arc	20 min



12 Jan 65	Replaced inner and outer air nozzles	Burned by arc	20 min
13 Jan 65	Replaced control box cable		36 hrs
18 Jan 65	Replaced auxiliary reflector and dowser	Previously burnt by arc, replaced during maintenance period	None
19 Jan 65	Castor wheel lost during road march	No replacement available	None
26 Jan 65	Replaced positive rod support tube	Broken while the searchlight was being brought into action	5 min
31 Jan 65	Replaced air tube	Cracked	None
6 Feb 65	Replaced positive head assembly, auxiliary reflector, inner and outer air nozzles and removed negative forward limit switch (S-21)	Burned by arc, circuit breaker on searchlight was cracked but still operational	12 hrs
10 Feb 65	Replaced negative forward feed (K7) and positive cycling (K8) relays	Carbons not feeding properly	4 hrs
24 Feb 65	Replaced negative position motor (B-6)	Negative disk pulled back too far	None
8 Mar 65	Replaced inner and outer air nozzles, dowser, auxiliary reflector and negative forward limit switch (S-21)	Burned by arc, 5 S-21 switches fabricated by 8th FRRU	8 days
<u>Searchlight No. 5, USA 8C5817, serial No. 32</u>			
6 Jan 65	Repaired broken wires in control box cable		36 hrs
8 Jan 65	Strike solenoid (L-2) inoperative, replaced control box cable	No replacement	12 days

# ANNEX D

20 Jan 65	Replaced striker solenoid (L-2)	Removed from Light No. 1	None
30 Jan 65	Replaced inner air nozzle	Burned by arc	12 hrs
31 Jan 65	Replaced contactor relay (K2), striker switch (S-10) and striker test switch (S-12)		12 hrs
6 Feb 65	Replaced inner air nozzle and arc viewing window glass	Glass was broken by vibration during road march	None
9 Feb 65	Replaced inner air nozzle	Burned by arc	None
16 Feb 65	Replaced dowsers solenoid (L-1) and inner and outer air nozzles		None
2 Mar 65	Replaced positive brushes (E-1), positive short carbon cutoff switch, arc viewing window glass	Glass was broken by vibration during road march	None
<u>Searchlight No. 6, USA 8C806, serial No. 31</u>			
9 Jan 65	Replaced control box cable		36 hrs
27 Jan 65	Repaired azimuth scale, and replaced arc viewing window glass, elevation brake and shock spring assembly broken	Items were broken due to driving at high speed over rough roads	None
9 Feb 65	Replaced positive cycling relay (K8), negative position (B-6) and negative rotation (B-4) motors, repaired off relay (K-1) and repaired negative drive train		3 days
27 Apr 65	Replaced contactor relay (K-2), adjust- ed positive protrusion sensing cell (CR-2)	Arc came on even at the off position	33 days

<u>Generator No. 1</u> , USA 8C5880, serial No. 33	None	
<u>Generator No. 2</u> , USA 8C5881, serial No. 34	None	
<u>Generator No. 3</u> , USA 8C5882, serial No. 35	None	
26 Jan 65 Base of thermocouple cracked causing leak	No replacement available	None
2 Feb 65 Circuit breaker tripped	Cause unknown	3 min
<u>Generator No. 4</u> , USA 8C5883, serial No. 36		
30 Dec 65 Replaced male connection on power cable	Contact was loose causing the light to cut off	1 hr
26 Jan 65 Base of thermocouple cracked causing oil leak	No replacement available	None
<u>Generator No. 5</u> , USA 8C5884, serial No. 37	None	
<u>Generator No. 6</u> , USA 8C5885, serial No. 38	None	

(U) ANNEX E  
EQUIPMENT FAULTS

1. DEFICIENCIES

<u>Deficiency</u>	<u>Suggested Corrective Action</u>	<u>Remarks</u>
a. Searchlight		
(1) Positive electrode contacts (FSN 6230-961-1133) did not fit properly.	Item be redesigned	EIR Case Report 4795-3901-03
(2) Airvane switch (P/N 1320ZE0401) did not withstand prolonged field operation.	Item be redesigned or eliminated.	EIR Case Report 4795-3906-01
b. Generator		
None		

2. SHORTCOMINGS

<u>Shortcomings</u>	<u>Suggested Corrective Action</u>	<u>Remarks</u>
a. Searchlight		
(1) Dowser was frequently burned by the arc and did not completely hide the afterglow.	Improve or remove.	
(2) Shock spring piston (P/N 1320ZE0487) separated from the piston head.	Piston head be more firmly attached to the piston rod.	EIR Case Report 4795-3901-06
(3) Arc viewing window glass (P/N 1302E0030) cracked.	A gasket be installed on both sides of the glass.	EIR Case Report 4795-3907-04
(4) Reduction gears on (P/N 1320ZE0660 and 1320ZE0543) electric	Improve quality control by manufacturer.	

ShortcomingsSuggested  
Corrective Action

motors were faulty.

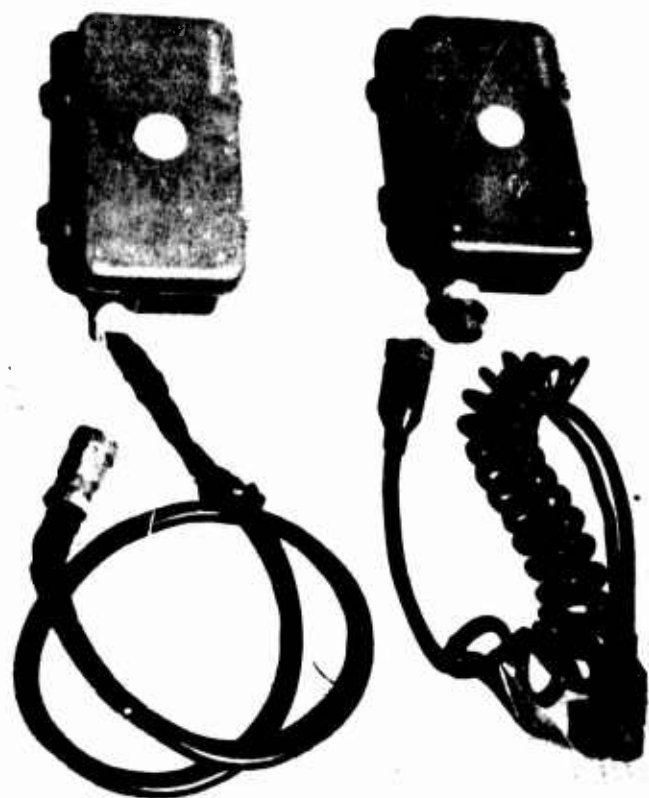
- |   |   |
|---|---|
| (5) Positive sensing cells (P/N 13208E8404) required constant adjustment.         | A locking device be developed.  |
| (6) Main reflectors (FSN 6230-961-1144) failed to retain their original luster.   | Coating process be investigated to determine causes and corrective actions to be taken. |
| (7) Sealed relays proved unreliable though they checked out in continuity checks. | A voltage source with meter be made available to the unit.                              |
| (8) Ampere meter (FSN 6625-851-4296) on control boxes failed.                     | Improve quality control by manufacturer.  |
| (9) Quality of positive carbon was poor.  | Improve quality control by manufacturer.  |

b. Generator

- |  |  |
|--|--|
| (1) Thermocouples (FSN 6685-647-2097) bases cracked causing small oil leaks.       | None   |
| (2) Male connectors (P/N 13204E1399) of power cables were easily scored and broken | Connectors be made of more durable material. |

3. CORRECTED DEFICIENCIES

<u>Deficiency</u>	<u>Corrective Action</u>	<u>Remarks</u>
Control box cables were of poor strength and durability.	Cables were replaced with new hardened, bonded cables sent from ERDL (figure E-1)	No difficulty was encountered with the new cables.



(U) FIGURE E-1. Control box cables (new bonded cable on right).

(U) APPENDIX TO ANNEX E

PART FAILURES

The parts which failed and adversely affected the operation of the searchlight or those for which an EIR was submitted were the airvane switch, the spring shock absorber, control box cables, dowsers, contact tension springs, and arc viewing windows.

a. AIRVANE SWITCH

The airvane switch was unreliable and could not withstand the shock of normal high speed road travel and sustained operations in Vietnam. The roller bearing contact, which is attached to the spring loaded door and is normally an open switch, had its connection broken five times when the lights were moved over rough roads. In three of the five cases, this failure was not detected during operation because the contact lodged in such a way as to close the electrical circuit and block the door in the closed position. In these three cases insufficient air came through the air nozzle which resulted in some or all of the following parts being burnt: auxiliary reflector, inner and outer air nozzles, positive contacts, tension spring, and dowsers. When parts were not available for immediate replacement, it was found that the switch could be inspected to insure it was not blocked and then electrically shorted at the terminal board in order to keep the light in operation. No further malfunction was attributed to the lack of this safety device. An EIR was submitted on this item.

b. SPRING SHOCK ABSORBER

The spring shock absorber, which is used as a travel lock to keep the lamp drum assembly from moving vertically while the searchlight is being towed, did not withstand high speed movement over Vietnamese roads. On five of the six lights used in the evaluation, the piston separated from the piston head. These items were repaired by welding the head back onto the piston. An EIR has been submitted on this item.

c. CONTROL BOX CABLES

All six of the original control box cables failed when internal wiring broke during the evaluation. These cables were repaired by stripping away the rubber covering and splicing the wiring. This proved unsatisfactory since the removal of the rubber covering also removed the water proofing, and since the tensile strength of the wire was not adequate, new breaks occurred frequently. These cables were replaced by new bonded rubber cables sent from ERDL early in the evaluation. The new cables performed without failure for the remainder of the evaluation. However, three control boxes had to be repaired later because of broken internal wiring.

#### D. DOWSER

The dowser and its interlock circuit did not endure under sustained field operations and did not effectively hide the arc afterglow. Two dowsers were burned in each searchlight and in one light the dowser solenoid failed after approximately 1.0 hours of operation. Although the afterglow lasted considerably less than the 30 to 40 seconds experienced with the 60-inch searchlight, it was necessary to elevate or traverse the light at least 1,600 mils away from the illuminated area immediately when the light was shut off to prevent range estimation by the enemy.

#### E. CONTACT TENSION SPRINGS

The upper and lower contact inserts of the positive rod electrode head assembly failed to maintain alignment during operation. These two contacts were held together by a single tension spring while the positive carbon rod was fed between them. The springs showed a tendency to lose their tension and two or three of the spring loops would straighten out. This caused the contacts to become loose and the positive carbon rod failed to feed properly. An EIR was submitted on this item. The problem was considered by ERDL to be a failure of the operator to align the contacts upon installation. However, even when great care was taken to align the contacts, the tension spring still stretched, causing the contacts to loosen. This was a failure of the spring which in turn caused the failure in the contacts.

#### F. ARC VIEWING WINDOWS

Four glass arc viewing windows cracked during the field evaluation. This was primarily attributed to vibration and shock which occurred during high speed road marches. These windows had a gasket only on the inside. It was believed that an additional gasket placed on the outside would have helped to prevent the windows from breaking. An EIR to this effect was submitted.



(U) ANNEX F  
REPAIR PARTS

The following is a list of all repair parts, including the overpack, received for the 30-inch searchlight set. The list is broken down by date on which the parts were received in Vietnam.

OVERPACK (22 to 23 October 1964)

<u>FSN</u>	<u>NOMENCLATURE</u>	<u>PART NR</u>	<u>QUANTITY</u>
4720-089-0854	Hose	13208E9518-1	6 ea
4720-089-0853	Hose	13208E9518-2	6 ea
2910-374-3565	Fuel Pump	1539909	6 ea
2920-536-5415	Kit, repair generator	1939194	6 ea
2920-536-5422	Kit, repair starter	1939201	6 ea
2920-842-7667	Kit, repair magneto	KIT09033-1	6 ea
6230-056-0065	Switch, overspeed	13204E7946	6 ea
5930-655-1580	Switch	MS35058-25	6 ea
5930-543-8374	Switch	MS25103-25	6 ea
5930-583-1602	Switch	132024E8013	6 ea
6230-055-9062	Relay	13204E7939	6 ea
6230-961-9475	Pump, electric	ORD83766299	6 ea
5920-221-4520	Fuse	MS90077-9	12 ea
6240-155-7836	Lamp	MS23237-327	36 ea
6230-967-5984	Tube, sucker ext	13208E9537	6 ea
6230-961-1146	Lens, plain	13202E0483	12 ea
6230-961-3624	Lens, special beam	13202E0455	6 ea
6230-961-1148	Lens, spread beam	13202E0452	6 ea
6230-076-2653	Tube support	13202E0441	6 ea
6230-078-4480	Glass, window	13202E0495	6 ea
6230-078-4479	Screen, image	13202E0033	6 ea
5977-961-3704	Roller feed	13202E0208	12 ea
6230-076-2652	Dowser	13202E0187	6 ea
6230-961-1142	Head, neg. contact	13202E0117	6 ea
6230-961-1132	Spring contact neg.	13202E0124	6 ea
6230-076-7601	Sprocket	13208E6057	6 ea
6230-076-2654	Chain	13202E0418	6 ea
6230-961-3610	Reflector	13202E0205	6 ea
6230-961-1130	Contact, positive	13202E0199	6 ea
6230-055-7346	Relay	13202E0534	12 ea
6230-010-5194	Relay	13202E0647	6 ea
6230-961-3633	Motor, drive	13202E0660	6 ea
6230-961-3609	Motor, drive	13202E0532	6 ea
6230-961-8312	Motor, drive	13202E0543	6 ea
6230-961-1145	Switch	13202E0405	6 ea
6230-961-3606	Switch	13202E0743	6 ea
5930-501-1622	Switch limit	13208E9532	24 ea

<u>FSN</u>	<u>NOMENCLATURE</u>	<u>PART NO.</u>	<u>QUANTITY</u>
5930-078-4483	Switch, terminal	13208BF102	6 ea
6230-078-4484	Fan, F.H. ext.	68-2-58	6 ea
6230-078-4485	Fan, L.H. ext.	68-3-58	6 ea
6230-961-1129	Electrode, positive	13202EO010	3600 ea
6230-961-3621	Electrode, negative	13202EO011	180 ea

(26 January 1965)

6230-961-1134	Nozzle, air outer	13202EO234	114 ea
6230-961-1135	Nozzle, air inner	13202EO204	114 ea
6210-961-1136	Spring, hel ext	13202EO263	12 ea
6230-961-3607	Solenoid, doser	13202EO486	1 ea
FFCN	Solenoid, pos, striker	13202EO581	1 ea

(3 February 1965)

3110-555-4000	Bearing	13202EO689	6 ea
6230-961-1147	Relay, positive	13202EO452	6 ea
6230-961-1139	Switch, thermo	13204EAC15	3 ea
6230-961-1131	Shaft pin assy	13202EO120	4 ea
6230-055-9064	Thermocouple	532948(C)	2 ea
6230-073-0009	Pump, coolant	1321232053	6 ea
6230-961-3607	Solenoid, doser	13202EO486	1 ea
5977-961-1206	Tube assy, air	13202EO207	4 ea
6230-961-3625	Brush	13203EO832	2 ea
6230-961-1143	Control	521-76468	1 ea
6230-961-3608	Relay, main	13202EO539	1 ea
6230-961-1149	Strap assy	13202EO552	4 ea
6230-055-7346	Relay	13202EO534	5 ea
6230-961-1129	Electrode, pos	13202EO010	600 ea
6230-961-3621	Electrode, neg	13202EO011	36 ea
5960-078-4532	Cell, phototon	13208E8A14	12 ea
6230-961-1133	Contact, pos adv	13202EO199	54 ea
6230-961-1137	Spring, tension	13202EO315	12 ea

(11 February 1965)

2990-014-8350	Shaft	13204EF033	2 ea
5960-073-0034	Sensing cell	13208E3404	6 ea
6625-015-0194	Voltmeter	13201E7878	1 ea
2990-014-8362	Control assy		2 ea
6230-014-8351	Governor		1 ea
2920-335-4677	Regulator		1 ea
2920-690-9975	Control assy		2 ea
6685-526-5442	Thermocouple	13204E8012	2 ea

(1 March 1965)

<u>FSN</u>	<u>NOMENCLATURE</u>	<u>PART NR</u>	<u>QUANTITY</u>
6240-155-7836	Lamp	MS-25237-327	36 ea
6230-055-7346	Relay, neg	13202E0534	1 ea
5930-078-4483	Switch	13208E8402	6 ea
5930-961-3700	Switch	13202E0823	6 ea
6230-961-1149	Strap assy	13202E0552	2 ea
6239-967-5983	Bracket linkage	13202E9523	6 ea
3110-112-5770	Bearing	13202E0361	6 ea
6230-055-5939	Blower, assy, air noz	13202E0538	2 ea
6230-961-1141	Heat exchanger	13204E1396	2 ea
5120-078-4481	Align tool	13212E2047	2 ea
4720-567-1681	Hose assy, hydraulic	MS28741-5-0420	3 ea
5310-543-2740	Washer lock	MS35333-74	100 ea
5305-543-2811	Screw	MS35233-76	100 ea
5310-043-1754	Washer	MS35337-79	100 ea
4720-567-1677	Hose	13202E0649-11	6 ea
4720-567-1678	Hose	13202E0649-42	6 ea
4720-567-1679	Tube, air	13202E0319-1	2 ea
5310-011-4947	Washer	13202E0123	6 ea
6230-961-1144	Reflector	13202E0251	2 ea
5977-B06-0002	Brush, pump motor	SK556-H	12 ea
3020-B06-0001	Sprocket	13208E8386	2 ea
5970-B06-0001	Block insulating	13204E1402	6 ea
5970-B06-0002	Washer, insulating	13208E8391	12 ea
3020-B06-0002	Idler, sprocket	13202E0115	2 ea
6685-B06-0012	Boot, thermostat	13212E9246	6 ea
4320-B06-0035	Pump, hydraulic	13202E0512	2 ea
6230-B06-0017	Case and shackle	13202E0475	1 ea
6230-B06-0018	Cover, lens	13212E9213	3 ea
5305-B06-0001	Screw	MS35233-28	100 ea
5925-B06-0001	Breaker, circuit	13202E0415	2 ea
3010-B06-0002	Drive assy	13202E0093	2 ea
3010-B06-0003	Ring drive	13202E0129	6 ea

(13 May 1965)

6238-961-3610	Reflector, aux	13202E0205	12 ea
NFSN	Switch, plate	13204E1401	12 ea

(19 May 1965)

5930-296-6229	Switch	13204E8014	3 ea
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(C) ANNEX G

## COMBAT OPERATIONS

### 1. OPERATIONS IN SUPPORT OF DONG NAI SENSITIVE AREA, III CORPS - 26 DECEMBER 1964 TO 20 JANUARY 1965.

During the period from 26 December 1964 to 20 January 1965, the 5th and 6th Sections of the Artillery Searchlight Platoon operated in support of the Dong Nai Sensitive Area which encompasses Bien Hoa Airfield. Initially, the two sections were co-located with the first platoon, C Battery, 52d Artillery in Camp Hung Vuong at the Bien Hoa Airfield. On 2 January, the sections were moved to Binh Tach Hill (YT 976147), a 28-meter high hill located just north of the airfield, and were placed in direct support of the 57th Regional Force (RF) Battalion which is responsible for airfield security. From then until departure from III Corps these sections illuminated 46 concentrations in support of ambush patrols. All of these concentrations were scheduled as to location and time, and direct illumination was used. No Viet Cong were detected during these operations.

Vietnamese commanders and their US advisors reported that the psychological effect on friendly troops was extremely beneficial. It was also reported that the searchlights provided much better illumination than either aircraft or artillery flares. This was attributed to the capability of the lights to illuminate for long periods without interruption, to the ability to shift quickly, and to the minimum requirement for adjustment. The corps artillery commander expressed a desire to retain the lights for permanent use as part of the airfield security force.

### 2. SUPPORT OF CAU DINH RELIEF CONVOY - 110315 JANUARY to 110530 JANUARY 1965.

On the night of 10 January 1965 the 3rd and 4th Sections were occupying positions located at the RVNAF Engineer School just north of the town of Thu Dau Mot. The section commander received a mission from 5th Division Artillery to support a relief convoy that was moving north on National Route 13 from Thu Dau Mot to Cau Dinh (XT 779223). The lights operated on command of the division artillery commander at 0315 hrs and shifted promptly in response to corrections made by the division artillery commander who was with the convoy. The searchlights employed a spread beam and used diffused illumination. The convoy conducted a blacked out road march and had good visibility 100 meters to each side of the road and fair visibility extending out to 500 meters on each side of the road. At Cau Dinh, approximately 10 km from the searchlight position, the light was sufficient to allow people to move about in the area without the aid of any other source of light.

The division artillery advisor reported that the searchlight provided a light intensity of about 1/2 to 3/4 moonlight along the route of

G-1

ANNEX G

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march. At Cau Dinh the light was equal to about 1/2 moonlight.

## 3. SUPPORT OF OPERATION DAN CHI 117/SD - 291630 JANUARY 1965 TO 301430 JANUARY 1965.

At 1630 hours the 5th and 6th Sections led by the platoon leader left Can Tho and moved approximately 40 km to Thai Lai (WS 619125). The sections were escorted during the move by three RF armored cars and an RF infantry platoon. They arrived at Thai Lai at 1800 hours and occupied a position as directed by the 21st Division artillery commander. The position was co-located with the 1st Platoon, B Battery, 211th Artillery Battalion and the headquarters of the RF battalion. The area was secured by the three armored cars and a RF company. Other units participating in the operation were the 33rd Infantry Regiment, 44th Ranger Battalion, and the 21st Reconnaissance Company. The searchlights received their initial mission at 2015 hours and from then until 2115 hours illuminated four concentrations at ranges of 8500, 8100, 6800, and 6200 meters using direct and diffused illumination. The lights illuminated another concentration at a range of 2000 meters from 2145 to 2200 hours. No enemy were observed.

All concentrations were requested by artillery forward observers using normal fire request channels and the standard fire request format. Units on the ground reported good visibility from 400 to 600 meters. The ARVN units were occupying hastily prepared positions for the night and the commanders felt that the only reason the VC did not attack was because of the lights. The advisor to the reconnaissance company had stated that his unit did not have a forward observer and did not know whom to contact to request illumination. No illumination plan had been distributed. The weather was clear and there was no moon.

## 4. SUPPORT OF TAN HUNG OUTPOST - 312400 JANUARY TO 010230 FEBRUARY 1965.

At approximately 2400 hours on 31 Jan the 5th and 6th Section received a request from the Ba Xuyen Province Chief to illuminate Tan Hung outpost (XR177635). The section had arrived from Can Tho at 1730 hours that afternoon and was located with the 212th Artillery Battalion at the Soc Trang Airfield. By 0030 hours the light was in operation and providing illumination to the outpost which was under attack from an estimated platoon of Viet Cong. The outpost was located 12,000 meters from the searchlight position. Artillery fire was adjusted using the illumination provided by the searchlight and the VC were seen withdrawing. The section continued to provide illumination to the outpost until 0230 hours at which time the mission was terminated. The weather during the mission was clear.

The defenders of the outpost reported that they could see clearly to a distance of 100 meters in all directions with the illumination provided by the searchlights. They further reported that when the illumina-

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tion started the VC attack slowed noticeably.

## 5. SUPPORT OF SOC TRANG RADIO STATION - 042145 FEBRUARY TO 042215 FEBRUARY 1965.

At 2145 hours on 4 February the 5th and 6th Sections located at the Soc Trang Airfield were requested to illuminate Ba Xuyen province Radio Station which was being harassed by an estimated Viet Cong squad. The radio station was located 3200 meters from the searchlight position. The light was on-target by 2200 hours. By 2210 hours a forward observer was adjusting artillery fire into the VC positions and the enemy was seen withdrawing. The mission was terminated at 2215 hours and no further action occurred that night. The weather during the period was clear.

As in the Tan Hung outpost attack on 1 February, the defenders of the radio station noted that the VC harassment subsided considerably when the illumination started. Both of these incidents point out the value of having the searchlights constantly in position and ready to illuminate targets of opportunity when operating in a counterinsurgency environment.

## 6. SUPPORT OF OPERATION OF 5TH INFANTRY REGIMENT 031700 MARCH TO 040300 MARCH 1965.

At 1700 hours, 3 March, the commander of the combined 5th and 6th Sections was briefed by the 2d Division G3 on a search and destroy operation that was to be conducted that night by the 5th Infantry Regiment. The march covered about 12 km and the unit was escorted by an ARVN infantry company in 2½ ton trucks. The sections arrived in position at 2000 hours. At 2230 hours an artillery forward observer requested and adjusted an illumination concentration. At 2400 hours the forward observer reported that the infantry had killed three VC and captured six others using the illumination provided by the lights and requested that the section continue the illumination. At 0045 hours the forward observer requested a shift of the light to illuminate the final objective for the battalion assault. By 0200 hours the objective was secured and the infantry was ordered to move back to its home station. The searchlights road marched back to Tam Ky, arriving at 0300 hours.

Although the section commander was briefed on the operation, no provisions were made to develop and distribute an illumination plan. Both targets were illuminated as targets of opportunity. With a minimum of planning, illumination of the final objective could easily have been on-call. The illumination was adjusted using normal artillery procedures.

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(C) ANNEX H

## PROPOSED

### TABLE OF ORGANIZATION

#### FIELD ARTILLERY SEARCHLIGHT BATTERY

#### ARMY OF THE REPUBLIC OF VIETNAM

1. MISSION. To furnish direct or indirect illumination in support of tactical night operations.

2. ASSIGNMENT. Assigned to corps artillery.

3. CAPABILITIES.

a. The battery can provide mobile battlefield illumination for the area of one division under normal conditions. Each platoon is capable of providing battlefield illumination for the area of one regiment under normal conditions.

b. The unit can provide organizational maintenance of organic equipment.

c. The unit can provide a communications system for control of organic searchlights.

d. The unit is dependent upon higher or supported headquarters for survey and observation.

e. This organization is not capable of effective, coordinated defense of the unit's area or installation and performance of its illumination mission simultaneously.

4. BASIS OF ALLOCATION. One per corps.

5. MOBILITY. One hundred percent mobile.

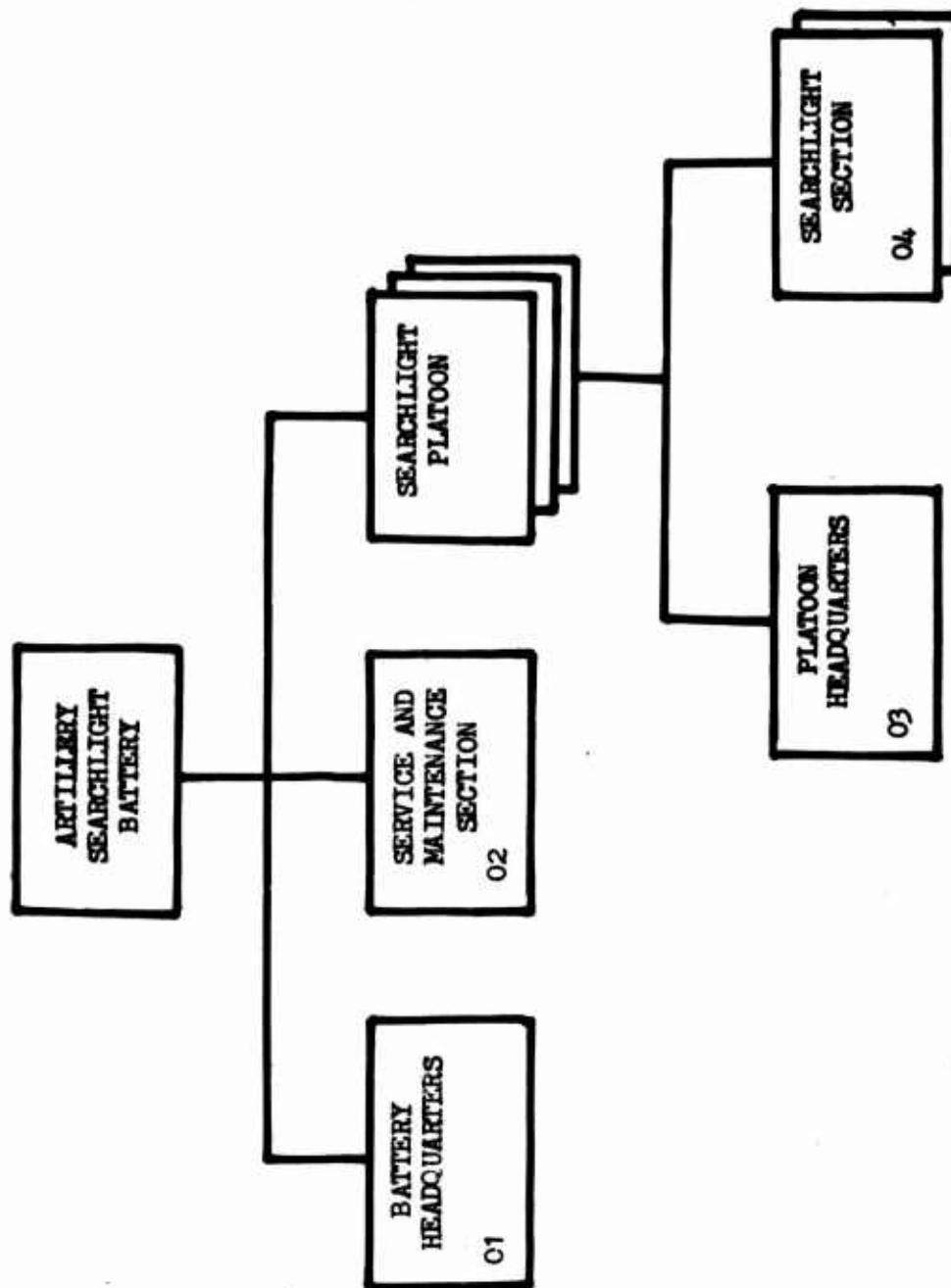
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ANNEX H

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PART II. (C) ORGANIZATION CHART  
PROPOSED  
FIELD ARTILLERY  
SEARCHLIGHT BATTERY



ANNEX H

H-2

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PART II. (C) ORGANIZATION AND PERSONNEL DISTRIBUTION

Section	Line Item	Designation	Classification	Branch	MOS	Full Strength		Civilian	General	Colonel	Lt Col	Major	Captain	1/Lt or 2/Lt	Sgt Maj	M/Sgt	1st Sgt	Sergeant	Cpl/1	Cpl	Pvt/1	Pvt	Remarks
1	2		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
01		<u>BATTERY HQ SECT</u>																					
	01	Battery Commander				1						1											
	02	Executive Officer				1																	
	03	Battery 1st Sgt				1																	
	04	Kitchen & Mess NCO				1																	
	05	Battery Clerk				1																	
	06	Typist/Office Boy				1																	
	07	Radio Opr/Driver				2																	
	08	Cook				2																	
SUB TOTAL						10						1	1		1	1	1	1	2	2	3		
02		<u>MAINT AND SVC SECT</u>																					
	01	Supply NCO				1												1					
	02	Motor NCO				1												1					
	03	Signal NCO				1												1					
	04	Searchlight Specialist				1												1					
	05	Supply Clerk/Driver				1												1					
	06	Motor Mechanic/Driver				1												1					
	07	Radio Mechanic/Dirver				1												1					
SUB TOTAL						7												3	1	3			

H-3

ANNEX H

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
03	01 02 03 04 05 06 07	3 SPT PLAT HQ SECT  Platoon Leader Platoon Sergeant Searchlight Specialist Computer Firing Chart Operator Typist/Office Boy Radio Opr/Driver				3 3 3 3 3 3 6							3			3		3 3	3	3 6		
04	01 02 03	6 SEARCHLIGHT SECT  Section Chief Electrical Specialist Searchlight Crewman				24							3			3		6	3	9		
		SUBTOTAL																				
		6 SEARCHLIGHT SECT  Section Chief Electrical Specialist Searchlight Crewman				6 6 12												6	6	12		
		SUB TOTAL				24												6	6	12		
		TOTAL				65						1	4		1	4	4	10	7	14	24	
			Officer: 5 NCO : 15 EX : 45 TOTAL : 65																			

ANNEX H

H.

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(U) ANNEX I

REFERENCES

1. AR 320-5 Dictionary of United States Army Terms
2. ATP 6-558 Field Artillery Searchlight Battery
3. ATT 6-6 Field Artillery Searchlight Battery
4. TOE 6-558D Field Artillery Battery, Searchlight
5. TOE 6-588E Field Artillery Battery, Searchlight
6. FM 6-115 The Field Artillery Searchlight Battery
7. FM 20-60 Battlefield Illumination
8. FM 23-85 60mm Mortar M-19
9. FM 23-90 81mm Mortar M-29
10. FM 23-92 4.2-inch Mortar M-30
11. FT 105-H-6 Firing Tables, Cannon, 105mm Howitzer
12. FT 155-Q-3 Firing Tables, Cannon, 155mm Howitzer
13. USAMSC Stock No. 7610-C-2079 Instructions and List of all Parts Manual for Searchlight, 30-inch Diameter Reflector, Trailer Mounted
14. USAMSC Stock No. 7610-C-2201 Maintenance, Overhaul, and Parts List for Generator Set, Gasoline Engine Driven, Trailer Mounted

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Security Classification

DOCUMENT CONTROL DATA - R&D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1 ORIGINATING ACTIVITY (Corporate author)		2a REPORT SECURITY CLASSIFICATION
Army Concept Team in Vietnam AIC San Francisco 96213		CONFIDENTIAL
		2b GROUP
		Group 4
3 REPORT TITLE		
SEARCHLIGHT ILLUMINATION (U)		
4 DESCRIPTIVE NOTES (Type of report and inclusive dates)		
FINAL REPORT - 26 December 1964 to 30 April 1965		
5 AUTHOR(S) (Last name, first name, initial)		
McDonald, Francis W, Capt, Armor		
6 REPORT DATE	7a TOTAL NO OF PAGES	7b NO OF REFS
30 November 1965	74	- 14
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b. PROJECT NO. None	None	
c. None	9b OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	JFALA Project Number 13-160.0	
10 AVAILABILITY/LIMITATION NOTICES		
Qualified requestors may obtain copies of this report from DDC		
11 SUPPLEMENTARY NOTES	12 SPONSORING MILITARY ACTIVITY	
None	US Army Combat Developments Command Fort Belvoir, Virginia	
13 ABSTRACT		
<p>The purpose of this evaluation was to determine the feasibility and desirability of employing artillery searchlights in the counterinsurgency effort in the Republic of Vietnam (RVN). (U)</p> <p>From 26 December 1964 to 30 April 1965, the Army Concept Team in Vietnam (ACTIV) conducted the evaluation of 30-inch diameter reflector carbon arc searchlights. This was accomplished by observing and analyzing operations of a test searchlight platoon of the Army of the Republic of Vietnam (ARVN) which was equipped with six US Army 30-inch searchlights. The evaluation was conducted under actual combat conditions and in no instance was the platoon employed merely to satisfy specific evaluation objectives. (U)</p> <p>The evaluation revealed that 30-inch searchlights could be effectively employed in counterinsurgency operations. The employment of the lights in pairs assured the availability of illumination when requested and allowed the platoon to support a large area. (C)</p> <p>It was concluded that introduction of additional searchlight units into Vietnam is desirable. However, prior to the organization of these units, Vietnamese mechanics and technicians must be thoroughly trained in all echelons of maintenance due to the complexity of the equipment. (C)</p>		

DD FORM 1473  
1 JAN 64

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Security Classification

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## Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
30-inch searchlights Searchlight platoon employment Counterinsurgency operations, Vietnam						

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